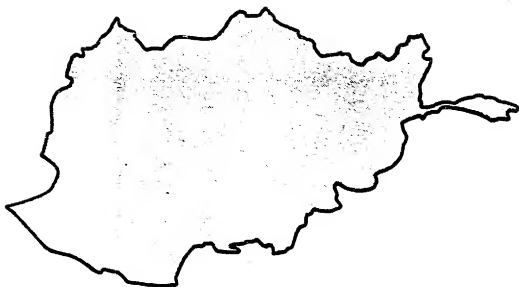


The Agricultural Survey of Afghanistan



SECOND REPORT

FARM POWER

VOLUME I

APRIL, 1989

The Swedish Committee for Afghanistan

doc. #8

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ERRATA

PAGE 6, LINE 2: "5 MILLION JERIBS (ABOUT ONE MILLION HA)"
SHOULD BE "6.3 MILLION JERIBS (ABOUT 1.3 MILLION HA)".

48.

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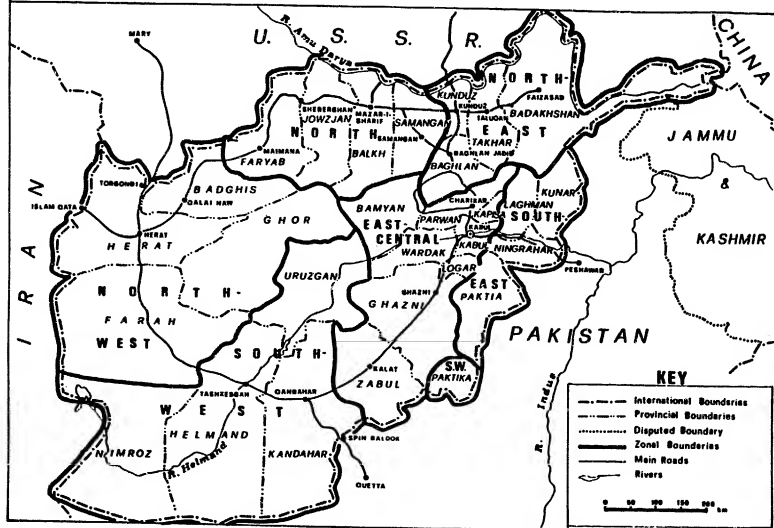
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Volume II contains the graphs and base tables for all the 29 provinces. The following graphs and tables are given:

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AGRICULTURAL SURVEY OF AFGHANISTAN

Showing Zones & Provinces



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The ASA would like to express its gratitude to all of these organizations.

This report may be photocopied or quoted with acknowledgement.

SUMMARY

1. "Farm power" is a conveniently short way of describing family labour, hired labour, oxen and other draught animals, stationary powered machinery such as threshers, and mobile powered machinery such as tractors. This report demonstrates that the shortage of farm power in Afghanistan is indeed serious, to the extent that if it is not dealt with as one of the earliest priorities during the rehabilitation phase, it may inhibit the usefulness of other agricultural inputs for several years to come.

2. The Survey shows that, whereas before the war more than 90% of farmers used their own oxen for ploughing, the figure in 1987 for farmers who were still there was 43%. The report estimates that about 500,000 oxen would be needed to make up the shortfall to reach pre-war levels, and further estimates that if the only way of achieving this were by natural increase, then it would take 17 years at 3% growth rate (FAO's estimated rate for Afghanistan's cattle). In some provinces the losses are low enough to allow natural regeneration in less than 5 years, in others regeneration will take more than 50 years. These figures (except for the 500,000 oxen shortfall) relate only to those farmers who stayed, and take no account of refugees, the large majority of whom must necessarily return with no oxen at all.

3. Clearly, the target for self-sufficiency in farm power must be sooner than this. But the logistics of importing large numbers of oxen from neighbouring countries are prohibitively difficult, and the wisdom of doing so, were it feasible, is doubtful. The cost of the delivered animals, the need to use scarce resources to grow fodder crops as opposed to grain crops, and the risk of disease and further losses among the better adapted local animals which survived the war, are only a few of the considerations. No Pakistan-based organisation has yet demonstrated that the delivery of large numbers of oxen is feasible, though some NGOs have delivered a small quantities with considerable logistical and other problems. There is no clear information on the performance of the delivered animals. A leading NGO with some experience of the delivery of oxen to Afghanistan, believes that a maximum of 1,000 animals per month^{1/} could be supplied from Pakistan and delivered to Afghanistan. Clearly this number, if indeed achievable, is adequate to meet only a small proportion of the need.

4. There are two main physical inputs, which are well tried and workable in Afghanistan, which can rapidly make up the shortfall in farm power, or can release existing oxen from certain tasks for which they are not essential, for more productive use. These are tractors, and stationary threshers. A third physical input, the use of crop protection chemicals, particularly herbicides, also shows promise but is not proven as being workable on a country-wide basis.

5. In addition to these two physical inputs, there are three other factors, or services, also well tried and workable in Afghanistan, which can enhance the effectiveness of these inputs. These are credit, training, and subsidy. A brief note on each of these three inputs and three services follows.

6. The use of tractors has increased dramatically during the war, the survey shows. For example, in the group of farmers who stayed in Afghanistan and did not become refugees, 6% hired tractors in 1978 and 15% did so in 1987. This national figure hides bigger changes in certain provinces. In the South-West zone for example, 14% of farmers hired tractors in 1978 compared to 61% in 1987. Farmers who became refugees owned and hired more tractors than farmers who stayed. Support for tractor use by the international community, if requested by the Afghan authorities, would therefore merely encourage a trend, rather than set a new course of direction. The increasing use of tractors may be one of at least two main ways of overcoming the power problem, but suppose for argument's sake it were the only means, then the scale of that power problem might be calculated as follows: assuming a shortfall of 250,000 pairs of oxen,

1. These should be of the right type and not all oxen in Pakistan are suitable, according to the same NGO. They should be small (about 250kgs), hardy and, for the higher areas, resistant to cold. Such animals are generally found in North-west Frontier Province. It is also relevant that the Government of Pakistan has already instituted a number of measures (such as meatless days for example) to preserve existing levels of cattle, and it might not condone large-scale procurement if it was found to be feasible.

and that a pair can cultivate 25 jerbis^{1/} (5ha) annually - a rough weighted average for dryland and irrigated areas), then sufficient tractors to cultivate 5 million jerbis (about one million ha) are required. At 300 jerbis (60ha) practical annual cultivation capacity for a 45hp tractor, then less than 21,000 tractors would be needed. This is a lot by any measure, but it is less than the present annual Pakistan new tractor market of about 25,000, and about two thirds of its annual manufacturing capacity. Expressed this way, 21,000 tractors, covering the needs of both farmers in Afghanistan and returning refugees, and spread over several years, appears manageable.

7. Threshers. The effect of farm power problems anywhere revolve around bottlenecks, and farmers and national planners know that the removal of those bottlenecks can result in large increases in productivity. Generally the most severe bottleneck in Afghan agriculture occurs between the winter and summer crops when one crop has to be threshed and land for the other has to be prepared. Yet oxen, and even tractors, are commonly used for threshing in the traditional way by driving them round the threshing floor. The survey did not cover the use of threshers, though it has highlighted and quantified the bottleneck. However, stationary threshers were used before the war and have reportedly increased substantially since, and at least one NGO is involved in their promotion. Their effect, apart from their prime one of threshing, is to release oxen for land preparation. No self-powered threshers are used in Afghanistan or are available in Pakistan, and in both these countries they are powered by tractor pto. In India, where self-powered machines are available, tractors are free for tillage work during the threshing season. Proposals are made in the report for the introduction of such self-powered threshers from India for trial in Afghanistan.

8. The complementary use of crop protection chemicals, particularly herbicides, could also release oxen for cultivation of a larger area than they covered in the past. Traditionally, farmers plough up to 5 times before sowing, and for wheat, the commonest crop, two passes are normal. Yet on most soils only the first ploughing followed by harrowing is normally needed to achieve a seedbed. The other passes are used to kill the small germinating weed seedlings which would compete with the crop if sown after the first ploughing. The use of desiccant herbicides at this time, and the use of selective herbicides at a later stage on the growing crop, can eliminate the drudgery of multiple ploughing, and release oxen (and tractors) to plough a wider area. More advanced farmers have identified their need for crop protection chemicals in the survey, and a successful pilot project for the delivery of herbicides by the ASA has been running for two crop seasons. It cannot be concluded from this pilot project, however, that the use of herbicides will be widespread. If they are adopted by farmers, even if only as an interim measure during the re-establishment of their farming operations, it would probably be under the supervision of extension agents, and with subsidised costs.

9. Credit, both traditional and formal, has played a most important part in the development of Afghan agriculture. Traditional credit includes the provision of services, such as ploughing, as well as money and physical inputs such as seed and fertiliser, by landowners for sharecroppers or tenants. Ownership of tractors by larger farmers generally means that small farmers also receive tractor services. It is important not to forget that during the last decade the majority of Afghans have been fighting for their right to keep their traditional feudal land tenure and rural social fabric. This in turn means that inputs and services provided from outside, including credit, should conform with this fabric.

10. Before the war formal credit through the Agricultural Development Bank (ADB) was successful in making tractors, threshers and crop protection chemicals available to farmers. Then the ADB system depended on careful checking and supervision of loan recipients. Now the agencies which have, indeed depend on, this expertise and stored information as the basis of a similar checking and supervision system are the Pakistan-based NGOs. These could form the basis of a new formal credit system in the event that the interim political period before the establishment of a central Government is prolonged. Sooner or later such a system would evolve into a rejuvenated ADB. Proposals for this are outlined in the report.

1. A generous figure but suitable for the purposes of this calculation. The actual average may be less than this.

11. Training of mechanics, machinery operators, blacksmiths, agro-chemical extension agents, veterinary assistants, and others is not adequate but is proceeding in Pakistan. There is scope for expansion of existing training programmes.
12. There is some scope for subsidy and this has been successful in the past in Afghanistan in promoting the use of, for example, fertilisers and crop protection chemicals. Experience in Afghanistan and in the region show that subsidy is generally harmful and counter-productive if applied to hire rates for agricultural machinery, or to local price levels of a particular commodity or good (in other words the transport costs of say, oxen, can be 100% subsidised, but bringing the local price of oxen down simply dries up the free-market supply of other oxen). Experience in Afghanistan also shows that subsidy has no demonstrably beneficial effect when applied to interest rates.
13. Regional experience suggests that single-axle walk-behind tractors, or small (25hp) four-wheel tractors, would not be successful in Afghanistan, and arguments for this are elaborated in the report. Additionally, although certain new machines and systems show some promise - for example, whole crop harvesters, and reaper-binders - these also are not proven. Extreme care should be taken in using refugee farmers or even those who stayed, both of whom are in a precarious position, in an experimental role. There is plenty which can be provided which is proven and workable, even if not perfect.
14. Experience gained by NGOs in Afghanistan also shows that the supply of tractors by aid agencies should be for individual ownership, if necessary supported by credit and the careful use of subsidy, in agreement with, and if possible guaranteed by, the shura or village council. Experience with cooperatives, institutionalised hire services, and communal ownership by shuras, shows that these are not worth further consideration.

1. INTRODUCTION

1.1. This report is the second produced by the Agricultural Survey of Afghanistan (ASA) and follows the May 1988 'First Report' which was a brief overview of the preliminary results of the 1987 survey. That report presented a chronicle of trends in Afghan agriculture over the decade since 1978, and confirmed that agriculture had been carefully and systematically targeted by the Soviets and the Kabul regime. It also identified a number of constraints that would have to be overcome during the agricultural rehabilitation phase which would necessarily have to precede large-scale repatriation of refugees. These included the repair of irrigation systems and the supply of basic farm inputs such as improved seed, fertiliser, agrochemicals - and farm power. The importance of farm power is such that it is the first of the more detailed reports to follow the May 1988 report.

1.2. The term 'farm power' embraces labour, animal draught and mechanical power in all their different forms. Labour can be family labour or hired labour, or can be in the form of sharecroppers, caretakers or tenants. Animal draught can be in the form of oxen or horses, owned, shared or hired. Mechanical power (for farm operations not including the supply of irrigation water) can be in the form of tractors or threshers, and again, they can be owned, shared, or hired. All these will be discussed in the report. In particular, the interrelationships between these, and the way in which these relationships have changed in an attempt to cope with the effects of war, will be discussed.

1.3. The report will draw on the following sources:

- the results of the 1987 and part of the 1988 survey;
- the experience of the various aid agencies engaged in cross-border operations from Pakistan in the field of farm power;
- the knowledge of several Afghans and others who knew Afghanistan before the war; and finally,
- the recent experience of neighbouring countries in agricultural mechanisation.

1.4. The intended prime purpose of this report is as a guide and a factual base for aid agencies in designing and managing their own projects. Or at least, it can form part of a dialogue on farm power in the rehabilitation phase between the aid agencies.

1.5. The report presents the consolidated statistical evidence derived from the database and attempts to interpret it. We believe that the statistics, which have been subjected to rigorous checks, present a fair description of the situation. However, it must always be kept in mind when reading this report that these statistics refer only to the farmers who were interviewed in the survey. Whether or not these were a representative sample is an open question. The fact that there were, in fact, two questionnaires - one for the community and one for individual farmers - meant that our Supervisors and Enumerators were always aware of the need to select a representative sample of farmers to include in the Survey, and we believe that the Survey went as far as it could, under the existing conditions of war, to ensure this. It must also be realised that large parts of certain provinces had to be avoided for security reasons and in that respect the results for certain provinces are not truly representative. It would therefore be a mistake to place too much reliance on the results when doing detailed planning, and specific projects should be based on further field investigations.

1.6. Our interpretation of the statistics is, of course, fallible, and anyone is free to interpret them in the light of his own experiences and knowledge of Afghan agriculture. Indeed, some of the trends and correlations are difficult to explain adequately, and communication from people and agencies offering alternative explanations would be welcome.

1.7. The original intention in writing this report was to simply present the statistics and to interpret them.

We have been urged to also present, where relevant, ideas on rehabilitation of Afghanistan's agriculture as far as farm power is concerned. A distinction therefore has to be made on what our own conclusions and proposals are, and what the statistics say. Generally this distinction will be obvious in the report, but where it is not the distinction is identified.

1.8. Chapter 2 of the report deals with an overview of the situation before the war. Chapter 3 then deals with detailed changes during the war, and the situation now on a provincial basis. (The general reader will probably want to miss out most of Chapter 3 which deals with individual provincial profiles and which is aimed mainly at those interested in these particular provinces). Chapter 4 summarises these changes and the situation now. Chapter 5 discusses the experience of neighbouring countries in the area of farm power so as to demonstrate to a certain extent what development might have taken place in Afghanistan if the war had not occurred. The rest of the report attempts to draw some conclusions on how assistance to Afghan farmers and returning refugees might best be provided.

1.9. The base statistics, even when condensed and processed into graphs and tables, are too bulky to include in this volume, and are therefore presented in a separate volume, Volume II. However, all tables and graphs for one province are included in Volume I so readers may obtain an idea of what is available for the other 28. We believe that many readers will be interested only in one or two provinces, and they are encouraged to ask for the annex on those provinces. It is probable that mainly the large aid agencies will be interested in the full set of annexes, and these are also available on request.

1.10. This report has raised a number of questions concerning farm power, and has identified the need for deeper information. The 1989 Survey questionnaire will seek to obtain further information on the use of farm power, in particular the use and distribution of different types of machinery and implements, as well as continuing the series of information already obtained.

2. SUMMARY OF FARM POWER BEFORE THE WAR

2.1. Table 2.1 (over) shows that, before the war, between 90% and 92% of farmers (depending on whether they were small or large farmers) used oxen for land cultivation. They usually (65% of smaller farmers and 74% of larger farmers) had their own oxen, or more rarely they shared their one animal with another farmer (20% of smaller farmers and 10% of larger farmers), or they hired a ploughman and oxen (7% and 6%). A small number of farmers, 3.5%, had their own tractor, and some, 5% of smaller farmers and 10% of larger farmers, hired tractors. The remainder, between 10% and 15%, used no animal or mechanical power for their farming operations, often because they had orchard crops. In the north and north-east it was traditional for farmers to use horses for ploughing, though oxen were predominant, and on some of the smallest farms in the east-central region donkeys were also sometimes used. Camels were occasionally used in the North and West. These broad national figures give a general overview, but conceal large provincial differences as Table 1 on the following page shows.

2.2. Column B, average numbers of oxen per family, shows substantial differences. All the provinces of the North-East region - Baghlan, Takar, Kunduz and Badakshan - and the North - Faryab, Balkh, Samangan and Jowzjan - were the most 'oxenized' provinces where the average family had a more than one pair ^{1/}. (The average family in Takar had 2.6 individual oxen, the highest value for the country). This is largely due to the larger average farm sizes in these provinces.

2.3. The rest of the country had, on the whole, farm families with about 1.5 oxen. It is simplistic, but convenient, to divide Afghanistan into these two areas from the farm power viewpoint. There are exceptions to this simplification: Badghis (2.0 oxen), Nimruz (1.8) and Herat (1.8) had much higher averages, again linked to average farm size. Helmand (0.9) had a much lower average because of the high level of tractor use, and Kandahar also had a low average (1.3) in relation to farm size, for the same reason. Kapisa (1.9 oxen) had a high average linked not to farm size (in fact, average farm size is the third smallest in the country), but to intensity of cropping.

2.4. Parwan (1.2 oxen), Paktika (1.3), Helmand (0.9), Kandahar (1.3), and Farah (1.1) were the least oxenized provinces. Parwan and Paktika have few oxen because of small farm sizes, many orchards, and farmers hiring or sharing oxen. (Apparently, in Parwan donkeys are often used, and even a mixed team of an ox and a donkey are not unusual). Helmand, Kandahar, and Farah have few oxen because of the high use of tractors (these three provinces are the three most tractorised in the country). Balkh is also heavily tractorised yet has a high average number of owned oxen (2.1); this seems to be because of the relatively small number of farmers hiring, as opposed to owning, tractors. Balkh farmers who are big enough to own tractors seem to use tractors only on their own farms.

2.5. As a result of the whole of the East-Central zone and Paktika having few oxen per farm, these provinces also have a high proportion of farmers hiring and sharing oxen. The hiring and sharing of oxen are also linked to small farms, as typified in South-East and East-Central zones. The sharing of oxen was much more important than hiring them, as one would expect in an agricultural economy where farmers are mutually inter-dependent.

2.6. Columns J and K show that Helmand was the most tractorised province in 1978, with 30% of farmers who stayed, and 21% of farmers who fled using their own tractors, and with 39% and 29%, respectively, hiring them. No other province even approaches this level of tractor use. Kandahar, with 10% and 6% using their own tractors, and 15% and 35% hiring them, is in second place. The average farmer in Farah actually owns more tractors but hires less than his counterpart in Kandahar, with 11% using their own, and

1. The First Report of May, 1988, was incorrect in that 'pairs of oxen' referred to should have been 'numbers of (single) oxen'. Specifically, the values given in Graph 9 and Table 6 should be halved. This mistake was due to incorrect translation from the Farsi and Pushto questionnaires, for which we apologise.

TABLE 2.1. SUMMARY OF PER MIL FARM POWER SITUATION

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
Arbitrary weighting factor	Pro mil Alghan.	Pro mil Congo	Pro mil Both	Pro mil of men	Pro mil Alghan.	Pro mil Congo	Pro mil Alghan.	Pro mil Congo	Pro mil Alghan.	Pro mil Congo	Pro mil Alghan.	Pro mil Congo	Pro mil Alghan.	Pro mil Congo	Pro mil Alghan.	Pro mil Congo	Pro mil Both	Pro mil Alghan.	Pro mil Congo	Pro mil Both
WEST (twd av)	2	1.1	1.2	1.1	25	95	93	4	4	0	2	1	2	1	0	42	90	46	39	43
Benin	1.1	1.1	1.1	1.1	97	97	97	3	4	0	2	1	3	3	15	32	40	43	39	40
Togo	1.4	1.2	1.3	1.1	91	90	92	2	4	0	1	0	2	0	4	60	80	79	43	73
Senegal	1.1	1.2	1.1	25	96	91	2	3	0	2	2	2	1	5	24	40	35	23	35	32
Gambia	1.0	1.2	1.2	0	67	90	33	4	0	4	0	0	0	0	0	51	23	32	64	19
WEST (twd av)	2	1.1	1.1	1.1	20	91	82	3	0	2	4	2	1	1	0	34	30	39	51	55
Senegal	1.1	1.1	1.1	25	82	95	14	3	5	3	0	0	0	0	5	43	51	47	39	49
Gambia	1.1	1.1	1.1	15	89	83	1	4	1	2	10	5	2	13	30	35	37	56	48	54
Senegal	1.0	1.1	1.0	0	90	83	0	7	0	0	0	0	0	0	0	31	50	34	23	33
Senegal	1.1	1.0	1.1	0	93	74	2	5	0	5	0	5	2	10	40	72	70	74	72	72
EAST (twd av)	3	.7	.9	.7	23	50	86	29	0	0	3	1	1	3	3	0	34	9	0	15
Kenya	.8	.9	.8	0	72	77	10	0	1	5	2	2	15	12	0	20	12	10	25	15
Kenya	.8	1.0	.9	34	63	66	31	0	4	4	0	0	0	1	7	12	12	0	13	14
Kenya	.8	.9	.8	0	43	69	45	0	15	5	0	0	0	2	4	11	5	7	12	7
Kenya	.8	1.0	.9	32	61	66	34	10	4	5	0	0	0	0	4	12	0	0	15	9
EAST-CENTRAL (twd av)	3	.7	.8	.7	20	56	70	31	19	0	7	2	1	5	5	13	20	15	10	24
Kenya	1.0	.8	.9	55	75	70	25	15	0	12	0	0	0	1	13	14	14	14	10	16
Kenya	.8	.8	.8	19	44	43	50	32	4	5	0	0	0	0	10	17	10	13	21	15
Kenya	.8	.8	.8	20	45	44	72	25	15	0	0	0	0	0	5	14	7	9	19	12
Kenya	.8	.8	.8	25	39	41	37	24	1	0	4	2	0	5	15	16	14	16	21	19
Kenya	.7	.9	.8	10	44	47	40	30	4	2	0	0	0	0	0	13	9	9	15	11
Kenya	.9	1.0	1.0	23	70	64	20	20	0	0	0	0	0	2	0	4	12	7	7	12
Kenya	.7	.8	.7	30	51	49	25	17	10	0	5	4	11	0	31	34	20	40	43	44
Kenya	.7	.8	.7	0	41	70	13	10	17	4	2	2	4	14	23	27	20	25	44	40
WEST (twd av)	1	.8	.7	.8	21	48	44	26	12	11	0	0	0	14	30	23	41	40	57	40
Kenya	.8	.7	.7	14	43	44	34	39	14	10	0	0	5	4	12	13	12	20	19	10
Kenya	.4	.8	.3	24	24	47	4	7	5	2	30	21	30	29	41	52	47	117	95	104
Kenya	.8	.5	.7	0	45	44	4	7	4	11	10	0	15	39	44	35	36	50	70	53
Kenya	.9	.9	.8	0	75	0	0	0	0	0	0	0	15	33	49	49	0	77	77	77
Kenya	.9	.9	.8	0	60	30	30	10	10	5	5	5	5	5	30	50	45	45	43	43
WEST (twd av)	2	.7	.9	.7	21	49	72	31	0	17	12	7	4	7	4	20	37	30	37	41
Kenya	.8	1.1	.9	24	64	75	13	4	10	4	5	0	4	13	21	44	25	30	44	24
Kenya	.8	.9	.8	15	54	70	26	17	20	11	0	0	0	0	17	31	19	23	25	24
Kenya	.9	1.2	1.0	0	66	95	14	4	0	7	0	0	0	0	17	31	30	41	37	32
Kenya	.8	.8	.6	24	30	50	24	0	16	17	11	11	11	15	35	31	30	40	45	40

11% and 15% hiring. Balkh farmers hire few tractors, as already discussed, and compared with other tractor owners they actually hire fewer - in relation to the tractors they own - than any other province. Thus, although the figures on farmers using their own tractors were 10% and 5%, the proportion of farmers hiring tractors was 2% and 13%. Similarly, farmers in Logar also hired few tractors in relation to those that owned them: 4% and 2% owned them, and only 3% of farmers who left hired them.

2.7. Conversely, Ghazni had few farmers owning tractors - 3% and 4% - but a relatively high proportion hiring them - 11% and 8%. Similarly, Paktia, although having an even smaller proportion of farmers using their own tractors, exceeds Ghazni in the use of hired tractors as a proportion of owned tractors; 2% of farmers owned tractors and 15% and 12% hired them. Baghlan also had 1% and 3% owning tractors, and 5% and 15% hiring them. This seems to indicate that in Ghazni, Paktia and Baghlan there was a well developed custom hire service such as exists in Pakistan.

3. CHANGES DURING THE WAR AND THE SITUATION NOW - PROVINCIAL PROFILES

INTRODUCTION

3.1 This section should be read in conjunction with the Third Report, 'Crops and Yields', where deeper information on cropping patterns, rotations, yields and average area under each crop, may be useful. Information from that report is, however, summarised here where it illustrates the background to the farm power situation.

3.2 For those who do require more detail, it should also be read in conjunction with the provincial annexes, contained in Volume II. Each province has 28 graphs or tables supporting this Main Report, a total of nearly 800. However, the main points in these tables are summarised in the text in this section so that it is only necessary for those involved in detailed planning, or those who need to have certain points or arguments further supported, who will need to refer to them.

3.3 It should be noted that farm sizes are based on 1978 values (even though the present tense is used in the text), because this is taken to be normal. The database has values for all the other years, and farm sizes have changed during the war to a certain extent, and the values for 1987 are presented in Chapter 4. Average farm sizes, which have an important bearing on the use and type of farm power, are given for the province as a whole, and for the two groups of farmers - those who became refugees and those who stayed. Farm size distribution is presented graphically in the annexes, but is presented in the text as modal (or most commonly occurring) values and the percentage of total farms occurring in a certain size range. Thus, where the modal value (actually presented here as a range) is close to the average value, and the percentage of farms occurring in that modal range is low, then there is a normal distribution. A skewed distribution, on the other hand, is where the modal value is very different from the average, and where the percentage of farms occurring in that modal range is high.

NORTH-EAST, BAGHLAN

Cropping Patterns and Farm Size Distribution

3.4 The most common rotation on the smaller farms is irrigated wheat followed by rice. On the larger farms ^{1/} rainfed wheat and barley are grown in addition to irrigated crops. Provincial average farm size is 42 jeribs. Average farm size for farmers who stayed is 32 jeribs, and the modal (or most commonly occurring) value, containing 24% of farms, is in the 11 to 15 jerib range. For farmers who left, average farm size is 48 jeribs, and the modal value, containing 21% of farms, is in the 21 to 30 jerib range.

Labour Use

3.5 Farmers who eventually became refugees kept more family labour (2.7 adults of the family) than those who stayed (who had 1.5 family members working on the farm). This graph also shows that as early as 1980 family labour of both groups started to fall, the larger farmers' families reducing much more rapidly than the smaller farmers. Also the larger farmers had much bigger households in 1978, though by 1986 the difference between the two groups had narrowed considerably in this respect. Presumably, farm families became smaller progressively with the older men and women working the farms and the younger men

1. The term 'larger farmer' and 'smaller farmer' is used throughout this report. This is a loose term because what is really meant by the term 'larger farmer' is in fact 'one who eventually became a refugee in 1987 and had farmed in Afghanistan up till, and including, 1986, and was eventually interviewed in a refugee camp in Pakistan'. 'Smaller farmer' means 'one who stayed in Afghanistan and was interviewed there in 1987 or 1988'. We know from the database that one group has on average larger land holdings than the other (see First Report dated May, 1988), and so these conveniently short descriptions for each group are used. There are, however, five exceptions to this general rule where the reverse is true - Badakhshan, Balkh, Jowzjan, Kandahar and Badghis.

leaving for the jihad. By 1986/87 family labour in both groups had been reduced by one third.

3.6 For those farms which hired labour, the number of workers fell only slightly between 1978 and 1987, with the larger farmers hiring 1.5 workers and the smaller farmers hiring just over one worker in 1978, falling to 1.4 and 0.9 respectively by 1986/87. However, the numbers of farmers who hired labour fell substantially in both groups from 1980 onwards, from 55% to 40% for the larger farmers up to 1986, and from 35% to 16% for smaller farmers up to 1987. Relatively, the larger farmers were less hard hit than the smaller farmers, with reductions of less than a third, and more than half respectively.

The Use of Oxen and Tractors

3.7 Both groups of farmers had the same number of oxen, just over one pair, in 1978. In both groups the numbers of oxen fell substantially, at a faster rate for the larger farmers who had more access to tractors, and by 1986 they had about 1.25 oxen, a reduction of 40%.

3.8 Thus the traditional sources of farm power - labour and oxen - were much reduced between 1978 and 1987. How, then, did the average farmer modify his farming operations to cope with this reduction? For irrigated wheat it can be seen that the use of tractors before the war was not uncommon. About 15% of larger farmers, and less than 5% of smaller farmers, used them for land preparation for wheat. In both groups the numbers using shared oxen increased substantially. For the larger farmers it roughly doubled from 5%, and for the smaller farmers it increased by a factor of about 5 from the same level. The use of hired oxen increased substantially, but only in the group of larger farmers.

3.9 The large increase in the number of smaller farmers using hired tractors from 1986 is the result of the spoils of war - a Government farm was successfully attacked by the mujahedin and tractors and spare parts captured. (Our Supervisor from that area reports that the use of tractors would have been greater but the mujahedin failed to capture any diesel fuel). Political analysts may be interested to see that there is no corresponding increase in the use of hired tractors among the larger farmers during the same year.

3.10 Labour availability is reported as the greatest farming problem after the direct effects of war for the last three years.

Conclusions concerning rehabilitation and future development

3.11 Baghlian has a long history of the use of tractors for all crops and for both groups of farmers. Support for farm machinery, including tractors, would therefore be well founded. With a 40% reduction in the numbers of draught oxen it is likely to take 18 years for regeneration to pre-war levels, assuming a 3% annual growth rate^{1/}. This growth rate also assumes that none are brought in from other provinces, although this may well happen. Also, the 18 year estimate refers only to farmers who stayed and does not include the needs of returning refugees who would return with no oxen at all. During this period the use of mechanical stationary threshers would release what draught oxen there are during the critical time between the wheat harvest and the sowing of rice and maize. The use of herbicides, if these become widely acceptable to farmers (which at present they are not) would permit fewer passes with the traditional plough during seedbed preparation for wheat and would allow a greater area to be ploughed with the existing number of oxen. Their use might also alleviate the labour problem.

1. According to FAO, the natural and historical growth rate for cattle in Afghanistan is about 3%, and their advice is that this is the rate that should safely be assumed during the rehabilitation period. It is possible that this rate could be raised through certain interventions but only marginally. It will be noted from the questionnaire for individual farmers that questions were asked on the sex and age of cattle in order to determine the herd structure in each province; however, insufficient information was actually obtained for this. The 3% growth rate is therefore based on the assumption that the proportion of female cattle in the provincial herds is normal.

NORTH-EAST, TAKAR

Cropping Patterns and Farm Size Distribution

3.12 Takar is characterised by comparatively large farms. Being off the country's main access route it has not been much affected by the direct effects of the war, except for the towns of Ishkemish and Farkhar. Indirect war effects, at least as far as agriculture is concerned, also do not appear to be as serious as most other areas.

3.13 The three main crops, going by the percentage of farmers who grew the crop, are, in order of importance, irrigated wheat, barley, and linseed, with rainfed wheat running a close fourth. Rice is also important. In terms of the average area of each crop the order is somewhat different - irrigated wheat, rainfed wheat, rice, linseed and barley. Average farm size overall is 73 jeribs. Average farm size for farmers who stayed is 87 jeribs ¹/₂, and the modal value, containing 28% of farms, is in the 76 to 100 jerib range. For farmers who left, average farm size is 60 jeribs, and the modal value, containing 21% of farms, is in the 21 to 30 jerib range.

Labour Use

3.14 Both groups have experienced a reduction in the size of the working farm family, though this is from a high level (only Paklia has a higher level - for farmers who became refugees). In 1978, farmers who stayed had three adult family workers: by 1987 this had fallen 23% to 2.3. Farmers who left experienced a bigger drop between 1978 and 1986 - 44% - from 2.5 to 1.4.

3.15 The amount of hired labour on the average farm for both groups remained more or less constant, and the percentage of farms using hired labour actually rose slightly for farmers who stayed. This was presumably the result of internal migration in Afghanistan to a comparatively safe area. For farmers who eventually left, the proportion of farms using hired labour fell by 15%, from 76% to 64%. These levels of hired labour are high in national terms and are indicative of the large average farm size.

The Use of Oxen and Tractors

3.16 Both groups of farmers have the largest average number of oxen in the country, with those who stayed having 2.8 animals in 1978, and those who left having 2.4. By 1986/87 numbers of oxen, for those farmers who stayed, had not declined much - 2.5 animals - a reduction of less than 11%. In fact, numbers have actually risen since 1980. For those who left the reduction was greater - 25% down to 1.8 oxen.

3.17 Concerning how farmers coped with the changes described above, there seems to have been remarkably little change during the war compared with other provinces. For the smaller farmers - the ones who stayed, the use of tractors was almost non-existent in 1978 and 1987. There was a small shift towards the sharing of oxen. For the larger farmers - the ones who left - there was some increase in the use of hired and owned tractors, and of hired and shared oxen, to compensate for the decline in the number of owned oxen. The use of all these more than doubled from 12.5% in 1978 to 28% in 1986, the remainder being the use of owned oxen.

3.18 Analysis of the question on greatest farming problems shows that in 1978 credit and power for land preparation were the most important. It is possible that these two were linked in that credit for tractors (through the Agricultural Development Bank) was their perceived greatest constraint. From 1980 direct effects of war are consistently reported as the biggest problem, with labour availability generally in second place.

1. This rather high value is because of the high proportion of rainfed to irrigated land in this province. The reader is referred to the full provincial annex, or to the Third Report, "Crops and Yields", which deals with this subject in more detail.

Conclusions concerning rehabilitation and future development.

3.19 As far as rehabilitation is concerned it appears that, although farmers have consistently reported the effects of war as their biggest problem since 1980, their farm power situation has not been as badly affected as most other provinces. They have managed to continue their farming operations without tractors, on the whole, and one concludes that they can continue with traditional sources of farm power such as ox draught for the present. Returning refugees, who would tend to be the larger farmers and who would generally have lost all their livestock, are likely to have little alternative but to use whatever tractor services are available, however. A closer analysis of the labour problem may reveal that this could be alleviated through the use of herbicides and other crop protection chemicals. For farmers who stayed natural regeneration of oxen will take four years.

NORTH-EAST, KUNDUZ

Cropping Patterns, and Farm Size Distribution

3.20 Irrigated wheat, rice, and barley are the main food crops, with cotton and linseed important cash crops (in terms of the proportion of farmers who grew the crop), though there are some large rainfed wheat growers who have a long history of the use of tractors. Average farm size overall is 35 jeribs. Average farm size for farmers who stayed is 24 jeribs, and the modal value, containing 32% of farms, is in the 11 to 15 jerib range. For farmers who left, average farm size is 40 jeribs and the modal value, containing 23% of farms, is in the 21 to 30 jerib range.

Labour Use

3.21 Family labour declined at a similar rate, 2.3 to 1.4, for the larger farmers, while it remained fairly constant for the smaller farmers who stayed. The numbers of hired labourers was also fairly constant for both groups. There is, as one would expect, a large difference between the proportion of farms hiring labour, with more of the larger farmers hiring labour than the smaller farmers. However, whereas the larger farmers have maintained a more or less constant level up till the time they became refugees, the smaller farmers hiring labour declined sharply from over 40% in 1978 to 12% in 1987. This may have been due to a shortage of labour for cash crops, such as cotton, linseed and melons, and a consequent rise in labour rates.

The Use of Oxen and Tractors

3.22 Power for land preparation was a problem even before the war and in 1978 the survey shows that credit (probably for tractors) was their greatest perceived problem, followed by power for land preparation. Numbers of oxen have declined steadily during the war from more than two to less than 1.5 (the difference between the larger and smaller farmers is so small as to be insignificant).

3.23 The hiring of tractors and the sharing or hiring of oxen have made up for the decline in the numbers of oxen on individual farms. The survey also shows that farmers identified labour availability as their greatest problem after the direct effects of war in 1985, '86 and '87.

Conclusions concerning rehabilitation and future development.

3.24 In view of the long history of the use of tractors by larger farmers in Kunduz, and their more widespread use by smaller farmers during the war, it can be concluded that further support to these trends are justified. With a 30% decrease in the numbers of draught oxen it is likely to take 12 years for regeneration to pre-war levels. As mentioned above for other provinces, the introduction of stationary threshers would release oxen for land preparation. It appears unlikely that the use of crop protection chemicals could relieve the serious labour shortage which has been identified by farmers, since this shortage is mainly due to the demand for cotton picking, cultivation of melons, and transplanting of rice, for

which labour is essential for the foreseeable future. A switch away from these labour intensive crops is identified in the "Crops and Yields" report due for release shortly.

NORTH-EAST, BADAQSHAN

Cropping Patterns and Farm Size Distribution

3.25 In 1978 the four main crops were barley, irrigated wheat, rainfed wheat, and linseed. In 1987 these were still the main four, though the order had changed to rainfed wheat, barley, linseed, and irrigated wheat. Average farm size overall is 32 jeribs. For farmers who stayed, average farm size is 51 jeribs, and the modal value, containing 33% of farms, is in the less than 5 jerib range. For farmers who left, average farm size is 23 jeribs, and the modal value, containing 26% of farms, is in the 11 to 15 jerib range. Badakhshan is unusual in that it was the larger farmers who stayed and the smaller farmers who left; normally it is the other way round. However, with a total of 39 farmers interviewed, of which 12 were interviewed in Badakhshan, this sample is rather small and may not be representative.

Labour Use

3.26 Unusually, the smaller farmers had more family labour than the larger farmers in 1978, 3 adults compared with 2.3. In both cases there was a sharp decline, to 1.8 and 1.3 respectively. The numbers of hired labourers, and the proportion of those farms which had them, remained fairly static, though there is a large difference between the larger and smaller farmers - 90% for the larger farmers compared to 30% for smaller farmers, figures which are true for 1978 and 1987.

3.27 For the farmers who stayed, the numbers of oxen declined only slightly, from 1.6 to 1.3 animals, while for the larger farmers the decline was more rapid, from 2.4 to 1.7 animals.

3.28 Farmers were used to sharing oxen even before the war, though there has been a large increase during the war as a result of the decline in oxen numbers. For example, for irrigated wheat at the beginning of the war the amount of farmers using their own oxen compared to shared oxen was two thirds:one third, whereas by 1987 it was one third:two thirds. The survey indicates that tractors are not used at all. Even the use of hired oxen seems to have been unknown up to 1987, and then only for rainfed wheat on presumably larger farms.

Conclusions concerning rehabilitation and future development

3.29 For farmers who stayed the decline in numbers of oxen has been only slight (19%) and it can be concluded that they can continue to use shared oxen as they have been doing until numbers are regenerated in about 7 years. For those who will return, and who presumably lost all their oxen, they will also probably have to rely largely on sharing. The fact that there is no history of the use of tractors, and that farms are small and inaccessible means that the introduction of tractors in the future, assuming that they are suitable for this type of farming at all, will have to be slow and careful. Tractors, therefore, must be ruled out for the rehabilitation phase. The introduction of stationary threshers would release oxen for land preparation. On such small farms and in such mountainous terrain, the use of small threshers which could be transported by two men might be appropriate, but these are not available in Afghanistan or Pakistan. With the relatively large amount of rainfed agriculture there is more flexibility with planting dates and therefore more days in the year for land preparation.

NORTH, FARYAB

Cropping Patterns and Farm Size Distribution

3.30 This is an area of mainly rainfed farms characterised by low yields, high risk, and poor farmers. Rainfed wheat, rainfed barley and irrigated wheat are the main crops. Linseed is a fairly important cash crop, and risk-avoiding crops such as millet and sesame are also grown. Average farm size overall is 47

jeribs. For farmers who stayed, average farm size is 43 jeribs, and the modal value, containing 32% of farms, is in the 31 to 40 jerib range. For farmers who left, average farm size is 51 jeribs, and the modal value, containing 24% of farms, is in the 21 to 30 jerib range.

Labour Use

3.31 Farmers who stayed kept all their family labour with them, about 2.5 adults throughout the war, whereas farmers who eventually left allowed their families to leave progressively so that the survey shows a decline in family labour from 2.2 to 1.6 adults. The number of hired labourers declined for both groups of farmers by about 30%. The percentage of farmers using labour fell by half for farmers who stayed, and fell by nearly a quarter for those who became refugees.

The Use of Oxen and Tractors

3.32 The effects of war on agriculture do not appear to have been as severe as most other provinces. For farmers who stayed, the number of animals of oxen declined from 2.4 to 1.8, and for those who left the decline was from 2.1 to 1.5 animals, in both cases representing a fall of about 25%.

3.33 The sharing and hiring of oxen before the war was not uncommon, and both of these increased to compensate for the decline in oxen numbers. Tractors were sometimes used before the war but only to a small extent and there was no increase during the war or a wider spread of that use by smaller farmers, according to the survey. The low yields obtained even before the war - less than 30 seers/jerib of rainfed wheat for example - could hardly have justified the cost of tractors.

Conclusions concerning rehabilitation and future development.

3.34 In conclusion, Faryab's agriculture has not been as badly affected as most other provinces. It will take ten years for the oxen herd to regenerate naturally, and in the meantime the hiring and sharing of oxen, already common, may be able to absorb the shortfall. The introduction of tractors in an area where they are little used at present and where average yields were, even before the war, well below the level at which they can be justified, may seem inappropriate. However, there is scope for the introduction of tractors and deep tillage implements for moisture preservation in the rainfed areas (together with improved seed) in order to increase yields. The introduction of stationary threshers and herbicides, if acceptable to farmers, would also alleviate the farm power shortage.

NORTH, BALKH

Cropping Patterns, and Farm Size Distribution

3.35 Main crops are irrigated wheat, barley, cotton, and rainfed wheat in that order. In limited areas rice, in rotation with irrigated wheat, is also important. Average farm size overall is 57 jeribs. Average farm size for farmers who stayed is 59 jeribs, and the modal value, containing 20% of farms, is in the 51 to 75 jerib range. For farmers who left, average farm size is 53 jeribs, and the modal value, containing 18% of farms, is in the 21 to 30 jerib range. Balkh has an unusually large number of farms between 100 and 400 jeribs, and has also a moderately good distribution of all farm sizes.

Labour Use

3.36 Adult family labour fell by over a third for farmers who stayed (1.9 to 1.3), and by 42% (2.6 to 1.5) for those who became refugees. The number of hired labourers on those farms which had them also fell by a third (2.0/1.8 to 1.4/1.3), and the proportion of farms hiring labour fell by 57% (88% to 38%) for farmers who stayed, and by 25% (62% to 46%) for those who became refugees.

3.37 The province's agriculture was quite badly affected by the war. According to reports, drought also affected agriculture adversely in this province. For those farmers who stayed, and for those who became

refugees, numbers of draught oxen fell by a third from 2.1/2.2 animals to 1.3.

3.38 In spite of this, the farm power picture for land preparation appears rather uniform, and the amount of owned and hired tractors for this operation did not increase during the war. Labour availability is consistently reported by farmers as a major problem, after direct effects of war.

Conclusions concerning rehabilitation and future development.

3.39 Balikh has a history of tractor use for both groups of farmers which started before the war. Yields of both dryland and irrigated crops are higher than, for example, those in Faryab and therefore support tractor use to a greater extent. The provincial oxen herd will take 14 years to regenerate through natural increase. Additionally, shortage of labour is perceived by farmers as one of their greatest constraints, being reported as their third greatest problem in 1985 and '86, and as their biggest problem after the direct effects of war in 1987. A mix of support for tractor use, stationary threshers (in particular for wheat) and the selective use of herbicides would alleviate these shortages of oxen and labour until the oxen regenerate and the labour returns.

NORTH, SAMANGAN

Cropping Patterns and Farm Size Distribution

3.40 The main crops are irrigated wheat, barley, rainfed wheat, and linseed. Overall, the province has been only moderately affected by the war (though it was particularly badly hit in 1985). Provincial average farm size is 54 jeribs. Average farm size for farmers who stayed (although the ASA has a rather small sample for this group - only 9 farmers) is 31 jeribs, and the modal value, containing 33% of farms, is in the 6 to 10 jerib range. For farmers who left, average farm size is 56 jeribs, and the modal value, containing 19% of farms, is in the 51 to 75 jerib range.

Labour Use

3.41 Family labour fell by 15% from 2.0 adults to 1.7 for farmers who stayed, while for those who became refugees family labour fell by a third from 2.4 adults to 1.6. For both groups of farmers the numbers of hired labourers, on those farms which had them, remained fairly static. For farmers who stayed the proportion of farms hiring labour actually rose by 50%, from 22% to 33%. Farmers who became refugees experienced a decline of 25%, from 56% to 42%.

The Use of Oxen and Tractors

3.42 For farmers who stayed the numbers of oxen have fallen by 16% from 1.9 animals in 1978 to 1.6 animals in 1987. For those who left in 1987, oxen numbers fell by 24% from 2.1 animals in 1978 to 1.6 animals in 1986.

3.43 To compensate for the decline in the availability of owned oxen, farmers who stayed filled the gap with shared oxen. This in fact was already practised to a certain extent before the war by both groups of farmers. By 1985, nearly a quarter of all the farmers who stayed were using shared oxen, a level they maintained till 1987. Farmers who stayed had not used tractors before the war, and did not do so during it. By contrast, those who became refugees had used tractors before the war and continued to use them at the same level (about 7% of farmers for irrigated wheat), while they made increasing use of hired and shared oxen. By 1986, their last year before leaving, hired tractors, and hired and shared oxen were used by 29% of farmers in equal proportions, the remaining 71% continuing to use their own oxen.

Conclusions concerning rehabilitation and future development.

3.44 Samangan has a history of tractor use from before the war (for the larger farmers, probably mainly those who left) and this would provide a foundation for any intervention to support the shortage of farm

power during the rehabilitation phase. For the farmers who stayed, whose combined oxen herd will take six years to naturally regenerate, the use of stationary threshers and the possibly the selective use of herbicides would alleviate the power shortage.

NORTH, JOWZJAN

Cropping Patterns, and Farm Size Distribution

3.45 Farming is predominantly rainfed, and the main crops are barley, rainfed wheat, irrigated wheat, and linseed (in terms of numbers of farmers who grew the crop). Average farm size overall is 76 jeribs. In this province there is, statistically speaking, an almost perfect distribution curve of farm sizes, unlike the skewed curve in most of the rest of the country. Average farm size for farmers who stayed is 81 jeribs, and the modal value, containing 16% of farms, is in the 21 to 30 jerib range. For farmers who left, average farm size is 72 jeribs, and the modal value, containing 15% of farms, is in the 31 to 40 jerib range. Jowzjan is unusual in that it was the larger farmers who stayed and the smaller farmers who left; normally it was the other way round. However, with such a perfect distribution of farm sizes, and only 14% difference between the two average sizes, this is perhaps not so remarkable.

Labour Use

3.46 Farmers who stayed saw their family labour decline moderately, by 10% from 2.1 adults to 1.9, while for those who left the decline was 46% from 2.4 adults to 1.3 by 1986. For farmers who stayed, and those who hired labour, the number of labourers did not decline but remained fairly static at 1.5 workers, though the proportion of farms with hired labour fell by a third from 49% to 33%. For farmers who left, the number of workers fell by nearly a quarter from 1.7 to 1.3, while the proportion hiring labour also fell by 42% from 62% to 36%. However, the shortage of labour does not rank highly among problems perceived by farmers, nor does there appear to have been a large exodus of refugees in comparison with other areas of Afghanistan.

The Use of Oxen and Tractors

3.47 The province's agriculture was quite badly affected by the war, as evidenced by the fact that farmers who stayed lost 47% of their draught oxen, while those who left in 1987 had lost 41% by 1986. Even as early as 1980 farmers identified the direct effects of war as their biggest problem.

3.48 Land preparation methods for the two main crops, barley and rainfed wheat, show large changes to cater for these losses. For farmers who stayed, the use of owned oxen fell from nearly 100% to 50%, the other 50% of farmers using hired or shared oxen, and in 1987 hired tractors to a small extent. For farmers who left, tractors were already being hired before the war (by about 5% of farmers), a level which for farmers who stayed, the massive loss of draught oxen will take a theoretical 22 years to regenerate naturally, and clearly a substantial intervention is necessary to make up this loss. As with other provinces the introduction of tractors is an existing trend which could be supported. The use of stationary threshers and possibly herbicides is also advocated to alleviate the power shortage.

SOUTH-EAST, PAKTIA

Cropping Patterns, and Farm Size Distribution

3.49 Farming is characterised by many small farms and a few much larger farms, and nowhere else in the country is there such difference in these two farming groups. Main crops are irrigated wheat, maize, barley, and rice. The maize and rice are generally grown in rotation with irrigated wheat. Average farm size overall is 12 jeribs. Average farm size for farmers who stayed is 8 jeribs, and the modal value, containing 57% of farms, is in the less than 5 jerib range. For farmers who left, average farm size is 21 jeribs, and the modal value, containing 25% of farms, is in the 6 to 10 jerib range.

Labour Use

3.50 Paktia is noted for the large sizes of its extended families and this is shown in the survey results for family labour on the farm - 3.2 adults in 1978 for families which eventually left (the highest value in the country), and 2.1 adults for families which stayed. These were reduced by 50% and 14% respectively. The numbers of hired workers per farm was the second highest in the country (only Paktika is higher) at 2.6 in 1978 for farmers who left, and this was reduced by 46% to 1.4 by 1986. For farmers who stayed the level remained fairly constant at 1.2 workers. However, in comparison with other provinces, few farmers hire labour; about 2% for farmers who stayed, a level which hardly changed during the war, and 17% in 1978 for farmers who left, a level which fell to 12% by 1986. No other province in Afghanistan has so few farmers hiring labour, a fact which is attributed to the fact that there are few farmers growing labour intensive crops such as fruits, vegetables and cotton.

The Use of Oxen and Tractors

3.51 The province has been severely affected by the war and farmers who stayed have seen their oxen halved in numbers, from 1.6 animals to 0.8, while for those who left had their oxen reduced by 43% from 1.7 animals to 1.0.

3.52 About 10% of farmers who became refugees had been using tractors before the war, and roughly this level continued during the war until they left. For farmers who stayed, the same was true in 1978, but by 1987 three times as many were hiring tractors, i.e. 30%. Both groups increased their use of shared oxen, by a factor of about two for farmers who left, and of about three for farmers who stayed. For farmers who stayed, the proportion still using their own oxen dropped from about three quarters in 1978 to just over a quarter in 1987. For farmers who left, those who used their own oxen fell from three quarters to a bit more than half, the remainder using a mixture of hired tractor, hired and shared oxen, and (for maize) manual means. Power for land preparation is consistently reported as a major problem in the last three years.

Conclusions concerning rehabilitation and future development

3.53 The use of tractors before the war by larger farmers, the increase during the war by farmers who stayed, and the proximity to the Pakistan border, all indicate that any intervention to support tractor use would be well founded. The theoretical 24 years of natural increase to reach pre-war levels of oxen (for those who stayed alone, not counting those who would return with no oxen at all) mean that importation from Pakistan is likely. Again, the nearness to the border make this feasible. Additionally, the introduction of stationary threshers (of which several have been introduced during the war, apparently), would release existing oxen from the mid-summer power peak between the wheat harvest and the sowing of maize or rice. Indications are that the loss of labour is less severe than in many other provinces, and that the return of those who left is easier than elsewhere. Nevertheless, the selective use of herbicides would make fuller use of what labour there is. The answers to the survey question on 'farming problems' show that farmers regard the farm power problem as one of their biggest. In the three years since 1985 this is consistently put as their fourth most serious, after other obvious problems such as the direct effects of war, irrigation water availability, and the availability of fertiliser.

SOUTH-EAST, NINGREHAR

Cropping Patterns, and Farm Size Distribution

3.54 Ningrehar, also on the border, suffered nearly as badly as Paktia, and this damage particularly affected some of its most productive land. Principal crops are irrigated wheat in rotation with maize or rice, and barley as a rainfed crop. Average farm size overall is 12 jeribs. For farmers who stayed, average farm size was 7 jeribs, and the modal value, containing 48% of farms, was in the 6 to 10 jerib range. For farmers who left, average farm size was 12 jeribs, and the modal value, containing 37% of farms, was in the 6 to 10 jerib range.

Labour Use

3.55 The labour situation is similar to Paktia. Farmers who left had 2.8 adult family workers in 1978, and by 1986 this had halved to 1.4. Those who stayed had 2 adult family workers in 1978 and 1.2 in 1987. Few farmers hired labour - between 10% and 15% for the larger farmers, and almost zero for the smaller farmers, and the numbers hired, by farmers who eventually left, fell from 2.0 to 1.2.

The Use of Oxen and Tractors

3.56 For farmers who stayed, the number of oxen fell by 17% from 1.5 animals to 1.25, and for those who left by 43% from 1.9 to 1.1 animals.

3.57 The survey shows that tractors were hired by both groups of farmers since 1978. This increased substantially for farmers who left, to about four times the 1978 level for both wheat and maize, and in 1986 tractors were hired by 20% of farmers. Both groups of farmers had been sharing oxen since 1978, the smaller farmers to a much greater extent than the larger farmers. By 1987 about half of farmers who stayed were sharing oxen, compared to a third in 1978. For farmers who left, about two thirds were sharing oxen, compared to an insignificant proportion in 1978. For the last three years covered by the survey, farmers consistently reported labour availability as their most important problem after the direct effects of war.

Conclusions concerning rehabilitation and future development.

3.58 The conclusions for Paktia are relevant for Ningrehar, except that the oxen herd will take much less time to regenerate - six years for those who stayed. For the whole province, regeneration will, of course, take much longer than this.

SOUTH-EAST, LAGHMAN

Cropping Patterns, and Farm Size Distribution

3.59 Here also some of the agriculturally most productive areas been abandoned. Principle crops, according to the Survey, are irrigated wheat in rotation with maize and rice. Average farm size overall is 5 jeribs. Average farm size for farmers who stayed is 4 jeribs, and the modal value, containing 74% of farms, is in the less than 5 jerib range. For farmers who left, average farm size is 11 jeribs, and the modal value, containing 40% of farms, is in the 6 to 10 jerib range.

Labour Use

3.60 Family labour for farmers who stayed declined by 22% from 1.8 adults to 1.4, and for farmers who left the decline was 38% from 2.4 to 1.5. The number of hired labourers on those farms which had them declined only slightly - from 1.3 to 1.2 for farmers who stayed, and from 1.5 to 1.3 for farmers who left. The proportion of farms hiring labour hardly changed and was anyway low - 4% for farmers who stayed, and 10% for farmers who left.

The Use of Oxen and Tractors

3.61 For farmers who stayed, the number of oxen declined only marginally, 8% from 1.2 animals to 1.1. For farmers who left, the decline was 28% from 1.8 animals to 1.3.

3.62 Tractors were used by both groups of farmers since at least 1978, and unusually both groups used tractors to about the same extent. For farmers who stayed, the use of their own oxen declined from 40% in 1978 to 35% in 1987, with an increasing proportion using tractors, from about 15% in 1978 to about 20% in 1987, and the balance increasingly using shared oxen. For farmers who left, the use of tractors roughly doubled each year of the survey and (for maize) was a third of all farmers in 1986. Shared oxen were used

by a maximum of 15% of farmers, and the use of own oxen was still the method used by two thirds of farmers in 1986.

Conclusions concerning rehabilitation and future development.

3.63 Villages asked about their biggest farming problems put power for land preparation at the top of their list in 1987, with a weighted average of 22% (compared to 14%, in second place citing the direct effects of war). It seems that although the loss of oxen has been low in percentage terms, the fact that Laghman even before the war had one of the lowest absolute numbers of oxen per farm at little more than one animal (partly because of the small average farm size), means that this loss is severely felt. Any intervention to support the use of tractors would be based on a long history of their use for both groups of farmers. Widespread double cropping mean that the introduction of stationary threshers would be applicable here. The 'biggest farming problem' question show that there is a felt need for crop protection chemicals, with this identified as the fourth biggest problem in 1986.

SOUTH-EAST, KUNAR

Cropping Patterns, and Farm Size Distribution

3.64 Kunar is characterised by small farms and double cropping, and a small amount dryland cropping. Main crops are, in order of importance as identified by the Survey, maize, irrigated wheat, irrigated barley, and rice. Average farm size overall is 8 jeribs. For farmers who stayed, average farm size is 6 jeribs, and the modal value, containing 53% of farms, is in the 6 to 10 jerib range. For farmers who left, average farm size is 12 jeribs, and the modal value, containing 42% of farms, is in the 6 to 10 jerib range.

Labour Use

3.65 For farmers who stayed, family labour declined from 1.7 adults to 1.4, and for those who left from 2.3 to 1.0. The number of hired workers stayed the same for farmers who stayed, at 1 worker, though very few farmers hired labour, while for those who left, of whom about 12% hired workers in 1978 and 8% in 1986, there was a slight decline from 1.5 workers to 1.3.

The Use of Oxen and Tractors

3.66 Similarly to Laghman, for farmers who stayed the numbers of oxen declined only marginally, by 11% from 1.5 animals to 1.3, and for farmers who left by 37% from 1.9 animals to 1.2.

3.67 Both groups of farmers used tractors since at least 1978, but only to a small extent in that year. Unusually, farmers who stayed used tractors more in all years than farmers who left. In 1978 about 5% of those who stayed used tractors for the maize crop, a proportion which had doubled by 1987. About 60% of the same group used their own oxen, a level which remained more or less the same during the nine years covered by the survey. For farmers who left, the proportion using tractors increased marginally but did not rise above 5%. The use of their own oxen decreased from about 85% to about 75%, and the balance used shared oxen.

Conclusions concerning rehabilitation and future development.

3.68 Kunar is an area of moderately high yields in the Afghanistan context, which fact probably explains the use of tractors on such small farms. However, the steepness of the terrain prevents the widespread use of tractors. Although their farm power problems cannot be described as serious compared with most other provinces, any intervention to support tractor services would be based on long experience of their use by small and large farmers. Theoretically, regeneration of pre-war oxen levels will take four years. The introduction of stationary threshers may not be acceptable on these very small farms. It is logistically feasible to introduce oxen from Pakistan into this border province.

EAST-CENTRAL, KABUL

Cropping Patterns, and Farm Size Distribution

3.70 Main crops are irrigated wheat, maize, potatoes, and barley, with horticulture, especially grapes, also important. Average farm size overall is 14 jeribs. For farmers who stayed, (for whom the ASA has a very small sample - only 8 farmers) average farm size is 13 jeribs ^{1/}, and the modal value, containing 50% of farms, is in the 11 to 15 jerib range. For farmers who left, average farm size is 14 jeribs, and the modal value, containing 30% of farms, is in the 6 to 10 jerib range.

Labour Use

3.71 We see a similarly large decline in family workers. For those who stayed the fall was 42%, from 2.4 adults to 1.4, and for those who left it was 63% from 2.4 to 0.9. Hired labour for those who stayed remained unchanged at 2 workers up to 1986 and fell to 1.5 in 1987. For those who left, the number of hired workers went from 1.5 to 1.2. The proportion of farms hiring labour was more or less unchanged up till 1986, at 12% for farmers who stayed and 16% for those who left, but for those who stayed there was an increase in 1987 to 25%, presumably the result of internal migration.

3.72 The proximity to the capital obviously has resulted in changes to agriculture during the war. For farmers who stayed the numbers of oxen fell by 53% from 1.9 animals to 0.9 in 1987. For those who left the decline was 57% by 1986, from 1.6 animals to 0.7 animals.

3.73 As a result of these large changes, there have been large effects in the use of farm power. For farmers who stayed the use of owned oxen fell from 80% to 20% (for maize). The use of shared oxen, which had been 20% in 1978, rose substantially and then fell back to about the same level, the balance being taken up by hired oxen which in 1987 were used by 60% of farmers. None of these farmers, and none of those who left, had used tractors before the war, and none used them during it. Farmers who left had used hired oxen before the war, about 12% (for irrigated wheat), and this level increased to about 20% by 1986. At the same time their use of own oxen fell from 70% to 50%, and the balance was taken up by shared oxen.

Conclusions concerning rehabilitation and future development.

3.74 For farmers who stayed the provincial oxen herd will take 26 years to regenerate naturally, apart from the needs of returning farmers. As one might expect with such small farm sizes, there is no history of the use of tractors, and if there was any propensity to use them before the war, this would have been encouraged by the nearness of Kabul, and therefore of credit, supply and service. Thus, it cannot be assumed that the use of tractors would be appropriate during rehabilitation. However, the use of hired tractors may emerge after the war. Importation of oxen from other regions is problematical, particularly as the main source would be Pakistan whose oxen may not be able to stand the winter cold of Kabul. The introduction of stationary threshers, and the possible introduction of herbicides, the cost of which may be justifiable on the high value intensive cropping common in Kabul, are therefore likely to be the main means of alleviating the power shortage which is severe and will be long-lived.

EAST-CENTRAL, BAMYAN

Cropping Patterns, and Farm Size Distribution

3.75 Main crops are irrigated wheat, barley, rainfed wheat, and potatoes. Average farm size overall is 10

1. The survey did not cover farms close to Kabul city, for reasons of security. Farms close to the city are apparently smaller than those further away, and for this reason the average value shown here may be higher than the actual.

jeribs. For farmers who stayed, average farm size is also 10 jeribs, and the modal value, containing 36% of farms, is in the 6 to 10 jerib range. For farmers who left, average farm size is 17 jeribs, and the modal value, containing 26% of farms, is in the less-than-5 jerib range.

Labour Use

3.76 The family and hired labour situation was less severe. Family labour fell from 2.1 adults to 2.0 for farmers who stayed, and from 1.8 adults to 1.5 for farmers who left. The number of hired workers remained more or less the same for farmers who stayed, at 1.3, and for those who left the average number fell from 1.3 to 1.1. Similarly, the proportion of farmers using hired labour stayed at about the same level for farmers who stayed, at about 23%, and for farmers who left it fell from 30% to about 25%.

The Use of Oxen and Tractors

3.77 The effects of war have been moderately severe in relation to other provinces. For farmers who stayed, oxen numbers declined by 30%, from 1.5 animals to 1.1, while for those who left the decline was 23%, from 1.6 to 1.2 animals.

3.78 In 1978, the use of hired oxen was rare, and owned and shared oxen were used in about equal proportions in both farming groups. From 1980 the use of hired oxen increased substantially particularly for farmers who stayed where it increased from 5% in 1978 to 50% of the total in 1987. In neither group does the survey show the use of tractors at any time. Animal diseases are reported by farmers to be a major problem during the last three years covered by the survey.

Conclusions concerning rehabilitation and future development

3.79 The conclusions are much the same as for Kabul, i.e. for farmers who stayed the provincial oxen herd will take 12 years to regenerate naturally, apart from the needs of returning farmers. There is no history of the use of tractors mainly because of the small average farm size. Thus, it cannot be assumed that the use of tractors would be appropriate during rehabilitation. Importation of oxen from other regions is problematical for the same reason, cost. The introduction of stationary threshers, and the introduction of herbicides are therefore likely to be the main means of alleviating the power shortage.

EAST-CENTRAL, PARWAN

Cropping Patterns and Farm Size Distribution

3.80 Main crops are irrigated wheat, maize, grapes, and cotton. Average farm size overall is 7 jeribs. For farmers who stayed, average farm size is 5 jeribs, and the modal value, containing 61% of farms, is in the less than 5 jerib range. For farmers who left, average farm size is 14 jeribs, and the modal value, containing 27% of farms, is in the 6 to 10 jerib range.

Labour Use

3.81 Family workers on the farm, for farmers who stayed, actually rose from 2.6 adults to 2.9, and for those who left, family workers fell from 2.4 to 1.2 by 1986. For farmers who stayed, the numbers of hired workers and the proportion of farms hiring them remained about the same at 1.7 and 8% respectively, while for those who left, the average number of workers hired fell from 1.7 to 1.4, and the proportion of farms hiring labour rose from 17% to 30%, presumably as a result of internal migration.

The Use of Oxen and Tractors

3.82 The effects of the war on agriculture in Parwan were moderately severe. For farmers who stayed, the average number of oxen fell by 52% from 1.1 animals to 0.5 animals in 1987. Equally, for farmers who left, the decline was also 52% from 1.5 animals to 0.7.

3.83 The farm power situation has changed substantially as a result of these factors. For farmers who stayed, the proportion using their own oxen fell from nearly 65% to just over 10%, and whereas before the war the use of hired and shared oxen was quite common - being used by about 10% and 20% of farmers respectively - these two increased to take up all the slack, in roughly equal proportions, caused by the fall in the use of owned oxen. For farmers who left, the picture was much the same, except that the fall in the use of owned oxen was less, from 60% to about 40%, and the use of hired oxen was less proportionally. In neither group does the survey show the use of tractors at any time. Power for land preparation is reported as a major problem by farmers from 1985 to 1987.

Conclusions concerning rehabilitation and future development.

3.84 It will take a theoretical 25 years for the oxen herd to regenerate naturally. Yet substitution with tractors cannot be assumed to be workable without any previous experience of them, as well as the small size of farms and the prevalence of orchards. The alternatives of introducing stationary threshers and the careful introduction of selected herbicides remain to be tried. It is significant that farmers, in their own perception, put power for land preparation among the top three problems during the last three years of the survey. The need for herbicides was also seen by them as the fifth biggest problem in 1987, probably due to the specific need to control mildew in grapes, and insects in other top-fruit.

EAST-CENTRAL, LOGAR

Cropping Patterns, and Farm Size Distribution

3.85 Main crops are irrigated wheat, maize, barley, and potatoes. Average farm size overall is 14 jeribs. For farmers who stayed, average farm size is 13 jeribs, and the modal value, containing 38% of farms, is in the 6 to 10 jerib range. For farmers who left, average farm size is 16 jeribs, and the modal value, containing 36% of farms, is also in the 6 to 10 jerib range.

Labour Use

3.86 Family labour fell by 26% from 2.3 adults to 1.7 for farmers who stayed, and for those who left by 50% from 2.2 to 1.1. Hired labour fell from 2.2 workers to 1.4 in 1986 for those who stayed, and then rose again to 1.8 in 1987, probably due to an influx of people from Kabul. For farmers who left, the numbers of hired workers fell from 1.5 to 1.2. Few farmers of either group hired labour: 2% in 1978 for those who stayed, a level which rose to 8% in 1986, presumably due again to internal migration, and then declined to 4%; and 16% in 1978 for those who left, a level which fell to 10% in 1986. It is interesting to note that those who stayed hired more labour than those who left, probably due the fact that smaller farmers had higher value and more intensive cropping. It is also possible that the "hired labourers" were in fact mujahedin fighters keeping themselves usefully occupied between guerilla operations. Logar has been the scene of fierce fighting during the jihad.

The Use of Oxen and Tractors

3.87 For farmers who stayed, oxen numbers have fallen by 34% from 1.6 animals to 1, while for those who left numbers have fallen by 52% from 1.5 animals to 0.7.

3.88 The decline in the number of oxen shows up in the change in the use of farm power. 60% of farmers who left used their own oxen in 1978, and 40% did so in 1986. For farmers who stayed the equivalent figures were 60% and 35% (in 1987). Most of the difference was taken up by the use of shared oxen, which for both groups was at least twice as much as the use of hired oxen. The use of hired or owned tractors started in or before 1978 and remains at much the same level, about 5%, in all years covered by the survey. Power for land preparation is reported by farmers as the second main problem after the direct effects of war for the last three years covered by the survey, and in 1986 this even exceeded the direct effects of war.

Conclusions concerning rehabilitation and future development.

3.89 For farmers who stayed, regeneration of their oxen herds will take 14 years by natural increase. It seems that farmers have managed to keep their pre-war tractors going throughout the war. This together with the fact that both groups of farmers have experience of tractor use, even only a small percentage indicates that intervention to support tractor use would be well founded. The introduction of stationary threshers and herbicides would be appropriate. Farmers are well aware of the land preparation problem and in each of the last three years of the survey consistently identified it as their No.1 problem after the direct effects of war.

EAST-CENTRAL, WARDAK

Cropping Patterns, and Farm Size Distribution

3.90 The Survey shows that the main crops are irrigated wheat, potatoes, rice, maize, and barley. Average farm size overall is 9 jeribs. For farmers who stayed, average farm size is 6 jeribs, and the modal value containing 62% of farms, is in the less than 5 jerib range. For farmers who left, average farm size is 11 jeribs, and the modal value, containing 26% of farms, is in the 11 to 15 jerib range.

Labour Use

3.91 Family labour for farmers who stayed was not much affected and fell from 1.4 to 1.3 adults, while for those who left the decline was greater, from 1.9 to 1.4. For those who left, the numbers of hired workers remained the same at 1.1 workers, while for those who stayed the number fell from 1.4 to 1.1. Again, few either group hired labour, about 10% in both cases, and the changes during the war were insignificant.

The Use of Oxen and Tractors

3.92 For farmers who stayed, their numbers of oxen fell by 34% from 1.4 animals to 0.9, and for those who left numbers fell by 19% from 1.7 animals to 1.4.

3.93 Clearly, the farm power situation was already tight in 1978, since sharing of oxen was common then about 30% for farmers who left and about 50% for farmers who stayed. In both groups there was some increase during the war, though most of the increase was in the use of hired oxen which was practised to small extent in 1978. In neither group does the survey show the use of tractors at any time, presumably because of the very small average farm size. Farmers identify power for land preparation as a major problem from 1985 to 1987.

Conclusions concerning rehabilitation and future development.

3.94 With the high labour requirements of two of the principal crops, potatoes and rice, it is fortunate that the exodus of labour has not been as severe as some other provinces. However, the oxen herd will take 14 years to regenerate naturally and with no experience of the use of tractors their possible introduction cannot be assumed to succeed at once. Although Wardak is too cold to support double cropping in most areas, the introduction of stationary threshers would alleviate the oxen shortage, as also would the use of herbicides. That farmers are aware of their farm power shortage is evidenced by the fact that it ranks as greater problem than the direct effects of war in the last two years of the survey, and is in the top three problems in each of these two years.

EAST-CENTRAL, KAPISA

Cropping Patterns, and Farm Size Distribution

3.95 The main food crops are irrigated wheat, maize, barley, and rice. Average farm size overall is 7 jeribs. For farmers who stayed, average farm size is 6 jeribs, and the modal value, containing 54% of farms, is in the 6 to 10 jerib range.

the less than 5 jerib range. For farmers who left, average farm size is 12 jeribs, and the modal value, containing 40% of farms, is in the 6 to 10 jerib range.

Labour Use

3.96 Family labour for farmers who stayed fell slightly during the war but regained its 1978 level in 1987, 2.3 adults. Farmers who left had 2.5 family workers in 1978 and 1.4 in 1987. There was little change in the numbers of workers hired, about one for farmers who stayed and about 1.4 for farmers who left. The proportion of farmers hiring labour also remained about the same for farmers who stayed - 5%, and for farmers who left it declined from 36% to 32%.

The Use of Oxen and Tractors

3.97 For farmers who stayed the numbers of oxen fell by 10% from 1.8 animals to 1.6 animals, while for those who left numbers fell by 46% from 2 animals to 1.1.

3.98 On the whole the situation is not as bad as other provinces, but the use of oxen changed. In both groups the use of owned oxen fell from about 80% to about 60% and most of the remainder shared oxen. Additionally, there was a small amount of hiring. In neither group does the survey show the use of tractors at any time, again probably due to small average farm size.

Conclusions concerning rehabilitation and future development

3.99 From the figures the situation seems to be less serious than most other provinces, and for farmers who stayed it will take four years for their oxen to increase to 1978 levels. Nevertheless, even in 1978 farmers identified farm power as their second biggest farming problem after irrigation water availability. There is no experience of tractors so the alternatives mentioned for other provinces - threshers and herbicides - are the likely means of alleviating the power shortage.

EAST-CENTRAL, GHAZNI

Cropping Patterns, and Farm Size Distribution

3.100 Main food crops are irrigated wheat, barley, and maize. Average farm size overall is 32 jeribs. For farmers who stayed, average farm size is 31 jeribs, and the modal value, containing 25% of farms, is in the 21 to 30 jerib range. For farmers who left, average farm size is 34 jeribs, and the modal value, containing 18% of farms, is in the 6 to 10 jerib range.

Labour Use

3.101 Family labour and its decline was more or less the same for each group, falling by a third from about 1.8 adults to about 1.2. Hired labour for farmers who stayed fell by 27% from 1.1 to 0.8, and for farmers who left it fell only marginally from 1.4 to 1.3. The proportion of farms hiring labour fell in both groups; for farmers who stayed from 40% to 30%, and for farmers who left from 53% to 47%.

The Use of Oxen and Tractors

3.102 Agriculture here suffered some of the worst effects of the war. For farmers who stayed oxen numbers fell by 72%, from 1.3 animals to 0.4, while for those who left the fall was 55%, from 1.6 animals to 0.7.

3.103 As a result of the massive loss of draught oxen, there has been a large change in the use of farm power, and unusually it has been mainly tractors which have filled the gap, presumably because of the nearness of the Pakistan border. Indeed, there are reports of tractor operators/contractors crossing the border on a regular basis in search of higher paid business than they find in Pakistan. Both groups of

farmers had used tractors before the war, about 15% in both groups (for irrigated wheat). For farmers who stayed, in 1978, about 5% used their own tractors, 10% hired tractors, 10% hired oxen, 20% shared oxen, and the remainder, 55%, used their own oxen. By 1987, a complete reversal of this picture had occurred, with 55% using hired tractors, the same percentage, 5%, using their own tractors, and the remaining 40% equally divided between hired, shared and owned oxen. For barley, the change to the use of tractors was even greater with 80% hiring tractors, 5% using their own tractors, and the balance of 15% using their own oxen. For farmers who left there was also a decline in the use of owned oxen, from 70% to 40% for irrigated wheat, with most of the gap being filled by hiring of tractors and to a certain extent the hiring of oxen. It is not known whether more tractors were imported into the region (from Pakistan) or whether the existing tractors were able to serve a higher proportion of the farmers who stayed, but probably it was due to both these factors. Certainly, there was a large amount of displacement of farmers who fled to the city of Ghazni, Kabul, the mountains, or Pakistan, and those who arrived in Pakistan alone make up 9.5% of the total Afghan refugee population there. Farmers perceive power for land preparation as one of their greatest problems, and it is among the top four priorities during the last three years of the survey. The price of an ox in 1987 was, however, only 2.7 times the 1978 price which is not as high as one might expect. This may be due to a shortage of fodder. Farmers report labour availability as a major problem.

Conclusions concerning rehabilitation and future development.

3.104 The Ghazni experience is an interesting one, and it may be an indication of what may spontaneously happen in other provinces (which have some experience of the use of tractors) during rehabilitation when refugees who will have no oxen start to return. Then there will be extreme pressure on what oxen are available, and tractors will have to be used. Ghazni seems to have had little alternative but to use tractors - the theoretical regeneration time for oxen is 43 years. In this situation, every other possible means of alleviating the shortage should be tried, including the alternatives already mentioned - threshers and herbicides.

EAST-CENTRAL ZABUL

Cropping Patterns, and Farm Size Distribution

3.105 Main food crops are irrigated wheat, maize, and barley. Average farm size overall is 28 jeribs. For farmers who stayed, average farm size is 23 jeribs, and the modal value, containing 21% of farms, is in the 6 to 10 jerib range. For farmers who left, average farm size is 37 jeribs, and the modal value, containing 23% of farms, is in the 21 to 30 jerib range.

Labour Use

3.106 Family labour declined by two thirds from 1.5 adults to 0.5 adults for farmers who stayed, while for those who left the decline was 58% from 1.9 to 0.8. The average number of hired workers in 1978 was 1.1 for farmers who stayed, a figure which declined slightly and then rose to 1.3 by 1987. There was a similar pattern for farmers who left, starting at a higher level, 1.3, in 1978. For farmers who stayed the proportion of farmers hiring labour fell from 30% to 10% in 1987, while for farmers who left the proportion fell from 35% to 25%.

The Use of Oxen and Tractors

3.107 One of the greatest losses of oxen for farmers who stayed has occurred in Zabul where the loss has been 84%, from 1.3 animals to 0.2 animals. For farmers who left the loss was 62% from 1.6 animals to 0.6 in 1986. These extraordinarily high losses are only exceeded by those in Kandahar.

3.108 The large loss of oxen has led to equally large changes in the use of farm power. For farmers who stayed, those using their own oxen fell from just over 60% to under 20% (for irrigated wheat), the gap being filled by an expansion of shared and hired oxen, and hired tractors, while the use of owned tractors stayed at the pre-war level of less than 5%. Farmers who left had a similar experience, with the use of own oxen i

irrigated wheat going from 80% to less than 50%, and most of the difference coming from hired tractors. They also had less than 5% of owned tractors.

Conclusions concerning rehabilitation and future development.

3.109 The theoretical length of time for natural regeneration of the provincial herd of oxen, only for farmers who stayed and not counting those that will return with no oxen, would be almost meaningless to a farmer or even an aid institution, but is in fact 62 years. The history of tractor use for both groups of farmers provides a foundation for any intervention to support tractors. The use of threshers and herbicides would also be required.

SOUTH-WEST, PAKTIKA

Cropping Patterns, and Farm Size Distribution

3.110 Main crops are irrigated wheat, maize, barley. Average farm size overall is 12 jeribs. For farmers who stayed, average farm size is also 12 jeribs, and the modal value, containing 34% of farms, is in the less-than-5 jerib range. For farmers who left, average farm size is 13 jeribs, and the modal value, containing 36% of farms, is in the 5 to 10 jerib range.

Labour Use

3.111 Family labour for farmers who stayed fell from 1.8 to 1.6 adults, and for farmers who left from 2.3 to 1.7. The average number of hired workers is the third highest in the country and fell from 2.0 to 1.5 for farmers who stayed, and from 2.6 to 2.0 (with a 1985 peak of 3.1 due, presumably, to internal migration) for farmers who left. For both groups of farmers the proportion hiring labour was 10% and fell to about 2% only in 1987.

The Use of Oxen and Tractors

3.112 For farmers who stayed the numbers of oxen fell by 58% from 1.2 animals to 0.5 animals, while for those who left the fall was 46% from 1.4 animals to 0.8 animals.

3.113 Quite large changes have occurred in the use of farm power. In irrigated wheat, for farmers who stayed, those using their own oxen fell from 50% to 30%; those using shared oxen, already 40% in 1978, stayed at the same level; those using hired oxen went from 10% to 30%; and those using hired tractors went from 5% to 10%. For farmers who left, those using their own oxen fell from 50% to 15%, those using shared oxen rose from 30% to 40%, those using hired oxen fell slightly to about 10%, and those using hired tractors rose from 5% to 35%. Farmers perceive farm power availability as one of their greatest problems, ranking it as second priority in 1987 and 1988.

Conclusions concerning rehabilitation and future development.

3.114 The theoretical regeneration time for the provincial oxen herd is 30 years. The history of tractor use for both groups of farmers provides a foundation for any intervention to support tractors. The use of threshers and possibly herbicides would also be required.

SOUTH-WEST, HELMAND

Cropping Patterns, and Farm Size Distribution

3.115 Main crops are irrigated wheat, cotton and maize. Average farm size overall is 47 jeribs. For farmers who stayed, average farm size is 41 jeribs, and the modal value, containing 25% of farms, is in the 16 to 20 jerib range. For farmers who left, average farm size is 52 jeribs, and the modal value, containing 18% of farms, is in the 21 to 30 jerib range.

Labour Use

3.116 Family labour for farmers who stayed fell from 1.4 adults to 1.0, and for farmers who left the fall was from 1.7 to 0.9. The average number of hired workers for farmers who stayed fell from 1.8 to 1.6, and for those who left from 2.3 to 1.4 (1986). The proportion of farmers hiring labour fell from 55% to 30% for farmers who stayed, and from 55% to 50% (1986) for farmers who left. These relatively high figures are a reflection of the cash orientation of farming in Helmand.

The Use of Oxen and Tractors

3.117 Farmers here had few draught oxen at the beginning of the war though in percentage terms the losses were as high as most other provinces at 71% from 0.7 animals to 0.2 for farmers who stayed. Farmers who left experienced a 67% fall up to 1986, from 1.1 animals to 0.4 animals.

3.118 As a result of these changes, an already heavily mechanised agriculture has been forced to become even more mechanised. For farmers who stayed, for irrigated wheat, those using oxen fell from 30% in 1976 (at that time the lowest value for the country) to less than 15%, while the use of owned tractors fell from 30% to about 20% (presumably they could not keep them running due to poor availability of parts and fuel), and the use of hired tractors (presumably hired from those who managed to keep them running) rose from 40% to 65%. Farmers who left had a similar experience; in 1978 50% used their own oxen compared to just over 20% in 1986; those using their own tractors declined from 20% to 10%; those using hire tractors rose from 30% to nearly 50%; and the balance hired or shared oxen. Farmers perceive power for land preparation as a major problem in most years, and in 1987 it was second only to direct effects of war.

Conclusions concerning rehabilitation and future development

3.119 Clearly, a return to the pre-war situation of farmers relying equally on their own oxen, their own tractors, and hired tractors would be ideal. However, with the demand for oxen from other provinces which are less able to mechanise, and the theoretical regeneration time for Helmand anyway being 42 years, appears that the emphasis will inevitably be on tractors, together with stationary threshers and, acceptable to farmers, herbicides.

SOUTH-WEST, KANDAHAR¹

Cropping Patterns, and Farm Size Distribution

3.120 Main food crops are irrigated wheat, maize, and barley, with fruit also important. Average farm size overall is 35 jeribs. Average farm size for farmers who stayed is 46 jeribs, and the modal value, containing 22% of all farms, is in the 51 to 75 jerib range. For farmers who left, average farm size is 35 jeribs, and the modal value, containing 19% of all farms, is in the 21 to 30 jerib range.

Labour Use

3.121 Family labour for farmers who stayed fell by 38% from 2.1 adults to 1.3, and for those who left by 44% from 1.8 to 1.0. The number of hired workers for farmers who stayed fell from 1.5 to 0.6, and for those who left from 2.7 to 1.3. The proportion of farms hiring labour is high; for farmers who stayed it was 80% in 1978 falling to 68%, and for farmers who left the proportion rose up till 1986 from 62% to 68%.

1. The reader should be aware that the ASA had some problems in its coverage of Kandahar and in the event all the interview form from Kandahar itself had to be rejected. Interviews conducted in the camps in Pakistan totalled 474, a fair sample. The figures and conclusions presented are based on these and should be treated with caution.

The Use of Oxen and Tractors

3.122 The greatest average loss of oxen in the country, for farmers who stayed, occurred in Kandahar where numbers fell by 87% from 1.6 animals to 0.2 animals. For farmers who left, their loss up to 1986 was 69%, from 0.9 animals to 0.3 animals.

3.123 Large changes have occurred in the use of farm power. In irrigated wheat, for farmers who stayed, those using their own oxen fell from 70% to 10%, with almost all the difference being made up with hired tractors, and also shared and hired oxen to a small extent. The use of their own tractors seems not to have lasted beyond 1980, presumably because of lack of spare parts or destruction due to hostilities. For farmers who left, the use of owned oxen fell from 45% to 18% in 1986, with hired tractors again making up almost all the difference. The use of their own tractors, by about 5% of farmers in 1978, became less each year and was negligible by 1986, the year of their departure.

Conclusions concerning rehabilitation and future development.

3.124 With the long and substantial experience of tractors in Kandahar, the most practical option of alleviating the farm power shortage is the rehabilitation of tractor use. The theoretical regeneration time for oxen is nearly 70 years, and other provinces are clearly more deserving of any surplus animals in that they have more difficult alternatives to oxen. Again, the introduction of stationary threshers and herbicides is advocated.

SOUTH-WEST, NIMROZ

Cropping Patterns, and Farm Size Distribution

3.125 Main crops are irrigated wheat, maize, and barley. Average farm size for farmers who left is 69 jeribs and the modal value, in which 33% of farms occur, is in the 21 to 30 jerib range. (No farmers were interviewed in Nimroz itself, only in the camps).

Labour Use

3.126 Family labour fell 72% from 2.5 adults to 0.7. The average number of hired workers fell from 1.7 to 0.9, and the proportion of farms hiring labour fell from 75% to 25%.

The Use of Oxen and Tractors

3.127 Farmers who left experienced a 55% fall in oxen numbers from 1.8 animals to 0.8 animals.

3.128 The number of farmers using their own oxen (for irrigated wheat) fell from 78% to 30%, with all the balance being made up by hired tractors. Owned tractors were used by 10% of farmers in 1978 and 1980 and disappeared thereafter.

Conclusions concerning rehabilitation and future development.

3.129 The same conclusions can be made as for Kandahar and Helmand. Theoretical regeneration of the oxen herd based on losses by farmers who left up to 1986 only, is 27 years.

SOUTH-WEST, URUZGAN

Cropping Patterns, and Farm Size Distribution

3.130 Main crops are irrigated wheat, maize, barley, and rice. Average farm size for farmers who left is 38 jeribs, and the modal value, containing 20% of all farms, is in the 16 to 20 jerib range. (No farmers were interviewed in Uruzgan itself, only in the camps).

Labour Use

3.131 Family labour fell from 2.6 adults in 1978 to 1.9 in 1986. Hired labour is the highest in the country at 4.5 workers in 1978 falling to 2.7 in 1986, while the proportion of farms hiring workers rose marginally from 58% in 1978 to 60% in 1986.

The Use of Oxen and Tractors

3.132 For farmers who left, oxen numbers fell by 43% from 1.7 animals to 1.0 in 1986.

3.133 For irrigated wheat the number farmers using their own oxen fell from 60% in 1978 (the remaining 40% being shared oxen) to 30% in 1986. At first, this was compensated for by a corresponding increase in the use of hired oxen, then from 1985 hired tractors were used, apparently for the first time. It is reported that farmers from the neighbouring province of Kandahar sold tractors to farmers in Uruzgan (apparently for a low price) when they were in danger of being killed by the Kabul regime. They then fled to Pakistan. The proportion of farmers using shared oxen remained about the same up till 1986, i.e. 40%.

Conclusions concerning rehabilitation and future development.

3.134 Interventions to encourage a mixture of tractors (of which farmers there now have some experience since 1985), threshers, and herbicides would alleviate the oxen shortage which will take a theoretical 15 years to regenerate naturally.

NORTH-WEST, HERAT

Cropping Patterns, and Farm Size Distribution

3.135 Main crops are irrigated wheat, barley, and cotton. Average farm size overall is 23 jeribs. Average farm size for farmers who stayed is 21 jeribs and the modal value, containing 19% of farms, is in the 11 to 15 jerib range. For farmers who left, average farm size is 46 jeribs and the modal value, containing a quarter of farms, is in the 21 to 30 jerib range.

Labour Use

3.136 Family labour for those who stayed fell from 1.3 adults to 0.7, and for those who left it fell from 1.0 to 0.6 in 1986. Hired labour per farm for those who stayed fell from 0.8 to 0.6, but for those who left it rose from 1.5 to 1.7 in 1986. The proportion of farms hiring labour is very high in the national context, 75% for those who stayed, falling to 60%, and 90% for those who left falling to 68% by 1986.

The Use of Oxen and Tractors

3.137 Farmers who stayed experienced a fall of 34% in numbers of oxen from 1.5 animals to 1.0 animals. For those who left the fall was 65% up to 1986, from 2.1 animals to 0.7.

3.138 Substantial changes in the use of farm power have occurred. For farmers who stayed, for irrigated wheat, those using their own oxen fell from 68% to 45%. In 1978 about 15% of farmers shared oxen, 20% hired them, and less than 5% hired tractors. All these last three increased as the use of owned oxen decreased; shared oxen increased to 20%; hired oxen increased to 25%; and hired tractors increased to 10%. For those who left those using their own oxen fell from 75% to 25% in 1986; shared oxen increased from less than 5% in 1978 to 12% in 1985 and then apparently disappeared; hired oxen increased from 5% to 30%; and hired tractors increased from 12% to 45%. Labour availability is identified by farmers as the first major problem after the direct effects of war in 1987.

Conclusions concerning rehabilitation and future development.

3.139 Both groups of farmers have experience of tractors, the use of which has increased substantially since 1978. The flat land form of Herat is suited to the use of tractors providing that yields can rise to meet the cost involved. The theoretical regeneration time for oxen for the farmers who stayed is 14 years. Again, the introduction of threshers and herbicides would also be appropriate.

NORTH-WEST, GHOR

Cropping Patterns, and Farm Size Distribution

3.140 Main crops are irrigated wheat, rainfed wheat, barley, and maize. Average farm size overall is 19 jeribs. Average farm size for farmers who stayed is 17 jeribs, and the modal value, containing 42% of farms, is in the 6 to 10 jerib range. For farmers who left, average farm size is 21 jeribs, and the modal value, containing 21% of farms, is in the 21 to 30 jerib range.

Labour Use

3.141 For farmers who stayed, family labour was more or less static, starting and finishing at 1.5 adults, with a slight dip in the middle. Farmers who left had 1.8 adult family workers in 1978, falling to 1.5 in 1986. The number of hired workers remained static at about 1.0 for farmers who stayed, while for farmers who left it was also static at about 1.1. For farmers who stayed the proportion hiring labour fell slightly from 16% to 16%, while for farmers who left there was also a slight decline from 40% to 38%.

The Use of Oxen and Tractors

3.142 Farmers who stayed saw their oxen numbers fall by 22% from 1.5 animals to 1.2 animals. For those who left, oxen numbers fell by 12% from 1.7 animals to 1.5 animals.

3.143 Substantial changes have occurred in the use of farm power, though only in the way oxen are used. Thus, for farmers who stayed, the use of owned oxen (for irrigated wheat) fell from 55% to 38%; those using shared oxen increased from 25% to 35%; and those using hired oxen increased from 20% to 30%. In neither group is the use of tractors recorded at any time.

Conclusions concerning rehabilitation and future development.

3.144 Although the loss of oxen has not been severe in relative terms, it will nevertheless take nine years for their numbers to regenerate naturally. It is probable that the introduction of tractors would not be necessary and that the use of threshers and herbicides could make up the power shortfall in the meantime. The power shortage is mentioned by farmers as a constraint to their farming operations but it is rather far down their list of priorities.

NORTH-WEST, BADGHS

Cropping Patterns, and Farm Size Distribution

3.145 Main crops are irrigated wheat, barley, rainfed wheat, and maize. Average farm size overall is 32 jeribs. Average farm size for farmers who stayed is 37 jeribs, with the modal value, containing 38% of farms, in the 21 to 30 jerib range. For farmers who left, average farm size is 31 jeribs, with the modal value, containing 24% of farms, in the 31 to 40 jerib range.

Labour Use

3.146 Again, farmers who stayed were little affected, and family labour fell marginally from 2.4 to 2.3 adults. Farmers who stayed saw their family labour fall by 38% from 1.6 to 1.0. The number of hired workers

stayed the same for farmers who stayed, at 1.0 worker. For those who left, hired workers fell from 1.7 to 1.5. The proportion of farmers hiring labour was 50% for farmers who stayed, falling to 38%. For those who left, there was a slight rise from 62%, in 1978 falling again by 1986 to 60%.

The Use of Oxen and Tractors

3.147 For farmers who stayed the numbers of oxen remained the same at 1.8 animals. For those who left, numbers fell by 28% from 2.3 to 1.7 animals.

3.148 Not surprisingly, little change in the use of farm power has resulted from the above. For farmers who stayed 85% continued to use their own oxen throughout the war, the remaining 15% using shared oxen. For farmers who left, the picture was much the same in 1978 and 1980, with about 5% using shared oxen. Then in 1985 and 1986 about 10% of farmers used hired tractors.

Conclusions concerning rehabilitation and future development.

3.149 The war has had little effect on the farm power situation in relation to other provinces. The farmers here are not a priority for intervention as far as farm power is concerned. (It is possible, however, that the reported serious outbreak of locusts and grasshoppers in 1988, and the probability of an even more serious outbreak in the Spring of 1989, could affect the availability of fodder for livestock, including draught oxen).

NORTH-WEST, FARAH

Cropping Patterns, and Farm Size Distribution

3.150 Main crops are irrigated wheat, maize, and barley. Average farm size overall is 38 jeribs. Average farm size for farmers who stayed is 35 jeribs, and the modal value, containing 20% of farms, is in the 21 to 30 jerib range. For farmers who left, average farm size is 51 jeribs, and the modal value, containing 13% of farms, is also in the 21 to 30 jerib range.

Labour Use

3.151 Family labour for farmers who stayed fell from 1.1 to 0.7 adults, and for farmers who left the fall was from 1.6 to 0.9 adults. For farmers who stayed the number of hired workers fell from 1.6 to 1.1, and for those who left the number rose from 1.1 to 1.3. In both groups about 50% hired labour in 1978, and this fell to 33% for farmers who stayed, and to 28% for farmers who left.

The Use of Oxen and Tractors

3.152 Farmers who stayed saw their oxen decline by 52% from 1.1 animals to 0.5 animals. Farmers who left had a 56% decline from 1.2 animals to 0.5 animals.

3.153 The changes that have occurred in the use of farm power involve all the categories used in the survey. For farmers who stayed, the use of their own oxen declined from 40% to 20%, while the use of shared and hired oxen, and hired tractors increased, and the use of owned tractors declined. For farmers who left, there was some increase in the use of hired tractors (in irrigated wheat) while the use of owned tractors, owned oxen, and hired oxen remained largely the same. Thus, in 1986 45% were using their own oxen, 5% were sharing oxen, 12% were using hired oxen, 12% were using their own tractors, and 25% were hiring tractors.

Conclusions concerning rehabilitation and future development.

3.154 Both groups of farmers have substantial experience in the use of tractors, the use of which has not diminished during the war. Interventions to support their use would therefore be well founded. The

theoretical regeneration time for the provincial oxen herd (only for farmers who stayed) is 25 years, and any efforts to release them for wider distribution or more productive work such as through the introduction of stationary threshers would be worthwhile. The use of herbicides is also a possibility.

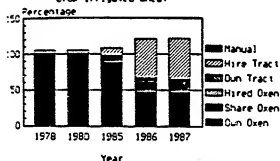
4. SUMMARY OF FARM POWER IN 1988 AND CHANGES DURING THE WAR

- 4.1. Comparing the table, Table 4.1 (page 39), with the equivalent table in Section 2 which summarises the farm power situation before the war, Table 2.1 (page 11), we see some remarkable changes.
- 4.2. The first thing to recognise is that what is called in the table 'Farm Size', which in fact means cultivated area (the farmer may still notionally own the same amount of land as before the war), has been substantially reduced in most areas. In the most populated rural zones of the country, the South-East and East-Central zones for example, average farm sizes have been reduced to a third of their pre-war levels. In such a situation, looking at the problem from a simple arithmetical viewpoint, as opposed to a logical agricultural viewpoint, one would expect there to be more labour, draught oxen and tractors to cultivate the reduced area.
- 4.3. However, this is not the case. The numbers of oxen, for example, have fallen by at least the same amount (compare the two Columns A). This indicates that the reduction in farm size is primarily because of the farm power shortage.
- 4.4. It is reassuring to note that the average area cultivated in relation to the number of pairs of oxen on the farm has remained remarkably constant except in those provinces where alternative forms of farm power, such as tractors, are available. This is, of course, to be expected, but the significance is in the fact that it acts as a check on the statistics.
- 4.5. Comparing Column E in each table, it can be seen that the percent of farmers who now use their own oxen has fallen by different amounts in the different zones of the country. In the South-West it has fallen to a quarter of the 1978 figure, from 40% to 10%. In most of the rest of the country, it has fallen by one third to a half; North-East, minus 33%; North, minus 32%; South-East, minus 22%; East-Central, minus 54%. Those provinces which already had tractors, or increased the use of tractors during the war, seem to have experienced the greatest fall in the use of oxen. This statement sounds rather obvious, but is actually open to a number of interpretations. Probably farmers in these areas were only able to stay because they had tractors or tractor services. Ghazni, for example, experienced a 75% fall in the use of owned oxen (see graph below) and a large increase in the price of animals. The high cost of animals, the risk of losing animals again after replacement, due to disease or shooting, and the high cost of feed, all discourage the farmer who has the possibility of hiring or buying a tractor from keeping oxen.
- 4.6. In most provinces there has been a large increase in the use of shared oxen, and this seems to have made up most of the shortfall in provinces where tractor services are not available. There has been an even greater rise in the use of hired, as opposed to shared, oxen. This may be the result of a trend towards a monetary economy and the view by farmers that replacing oxen is a poor, or at least risky, investment. The need to convert assets into easily moveable cash (by charging money for the use of oxen) is also likely.
- 4.7. This theory may also apply to the use of tractors. Certainly, there has been a general increase in the use of hired tractors in all zones. In Baghlan, for example, (see graph over) there has been a more than ten-fold increase.

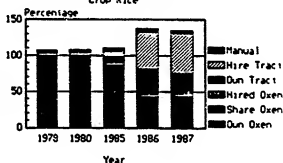
FARM POWER UTILIZATION

Province: Baghlan

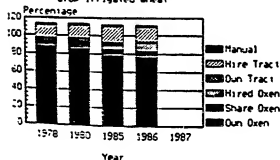
Farm Power - Farmers in Afghanistan
Province of Baghlan
Crop Irrigated Wheat



Farm Power - Farmers in Afghanistan
Province of Baghlan
Crop Rice



Farm Power - Farmers who left in 1987
Province of Baghlan
Crop Irrigated Wheat



Farm Power - Farmers who left in 1987
Province of Baghlan
Crop Rice

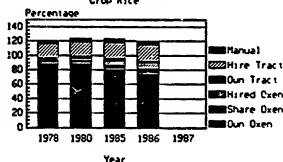


TABLE 4.1 SUMMARY OF 1987 FARM POWER SITUATION

		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	Arbitrary	Pro own	Pro own	Pro own	Price/	% using	% using	% using	% using	% using	% using	% using	% using	% using	% using	% using	Dr. farm	Dr. farm	Dr. farm
	weighting	Factor	Factor	Factor	per own	own	own	own	own	own	own	own	own	own	own	own	Dr. farm	Dr. farm	Dr. farm
		Factor	Factor	Factor	average	Factor	Factor	Factor	Factor	Factor	Factor	Factor	Factor	Factor	Factor	Factor	Factor	Factor	Factor
<hr/>																			
WEST (std av)																			
	2	.6			62	62		26		1		1		17		41			48
		.7			81	46		17		0		2		30		23			33
		1.3			70	91		8		2		0		0		81			65
		.8			87	76		19		1		0		30		0			11
		.7				33		67		0		0		0		30			77
<hr/>																			
WEST (std av)																			
	2	.6			64	62		26		10		2		0		36			50
		.9			60	64		23		14		0		0		31			34
		.7			58	86		4		4		9		4		30			34
		.8				73		25		0		0		0		21			31
		.6			74	24		27		20		0		36		40			80
<hr/>																			
WEST-EAST (std av)																			
	3	.6			68	43		37		7		1		9		3			5
		.7			74	20		29		2		3		35		4			10
		.7			79	51		44		4		0		0		2			3
		.6				34		46		10		0		0		2			4
		.7			52	65		29		6		0		0		2			3
<hr/>																			
EAST-CENTRAL (std av)																			
	3	.4			82	26		37		24		1		12		5			23
		.5			85	35		30		30		0		0		2			4
		.6			74	30		44		27		0		0		5			9
		.3			89	15		44		60		0		0		2			0
		.5			88	30		46		19		2		5		4			0
		.5			82	20		53		23		0		1		3			7
		.8			50	62		35		1		0		2		2			3
		.2			103	13		13		11		3		30		19			95
		.1				15		23		33		3		36		9			50
<hr/>																			
WEST-NORTH (std av)																			
	1	.2			85	10		15		7		0		41		14			133
		.3			73	12		34		10		2		32		3			12
		.1			93	11		0		2		21		46		13			110
		.1				6		10		2		0		86		27			270
<hr/>																			
WEST-NORTH (std av)																			
	2	.6			84	44		25		20		2		0		19			30
		.5			97	43		20		25		2		11		11			22
		.6			74	35		30		29		0		0		9			11
		.9				86		14		0		0		0		37			41
		.3			80	20		29		24		7		21		10			72

5. REGIONAL EXPERIENCE IN MECHANIZATION AND MECHANICAL AND ECONOMIC PRINCIPLES OF MECHANIZATION

Introduction

5.1 It is already clear from the foregoing that the pattern and character of farm power use in Afghanistan cannot and will not return to the pre-war situation. A return to the use of oxen by more than 90% of farmers, as was the case pre-war, seems unlikely even if it were possible. Changes have already occurred, and will continue to occur more rapidly during the rehabilitation phase, to compensate for the effects of war. At this time it may be helpful to record what the regional experience in mechanization has been, and the extent to which these have been moulded by certain mechanical and economic principles.

5.2 The experiences of Pakistan and Nepal are relevant to this discussion because of the importance of tractors and ox-drawn equipment in Pakistan, and the importance of handtools and hand-powered labour-saving implements in Nepal. The experience of Iran is less relevant because of the abrupt change of course of agricultural mechanization during the last few years and the fact that there is little information available. It is arguable that mechanization of agriculture in Afghanistan would have closely followed that of Pakistan if war had not interrupted the course of events. The Pakistan experience is particularly relevant as a counter-argument for those who may fear that tractorization will have adverse side effects, particularly in respect of labour displacement and the eviction of tenants. Having said this, it must be pointed out that any programme of tractorization must be well planned and directed at agriculturally and economically suitable areas. If this planning is lacking, the potential damage that inappropriate agricultural mechanization can do, if not properly implemented and governed by proper policy, is immense. The experience of India is not considered relevant here because the tractor manufacturing industry is beset by distortions created by excessive subsidies and local protection. Certain other items which are common in India, such as water pumps, disc harrows, chaff cutters, and threshers, can also be obtained in Pakistan.

Pakistan

5.3 There are roughly 230,000 tractors in Pakistan on a total cultivated area of just under 50 million acres (about 100 million jeribs), of which about one third is cultivated by tractor and the remainder by oxen. Over 80% of these are concentrated in areas of double cropping and heavy soils where oxen have difficulty in operating.

5.4 The custom hire market for tractors is predominant. Tractors probably spend less than 10% of their time on the owner's farm, and the 1975 Census of Agriculture showed that the average tractor worked on 21 other farms during the year. Even on farms of over 100 jeribs about half of all work is done by contractor. About 70% of tractor time is spent on transport and stationary work such as threshing and pumping.

5.5 Ownership and operation of tractors is almost exclusively by individual farmers or small businesses. Public sector ownership and operation of tractors is practically unknown.

5.6 The principal beneficial effects of tractorization have been, in order of importance; expansion of the cultivated area; or where expansion is not possible, an increase in cropping intensity of between 22% and 30% where oxen were replaced; and an increase in the proportion of cash and food crops to fodder crops.

5.7 Increase in the cultivated area, or cropping intensity, or both, increases largely as a result of the greater hourly output, by a factor of about forty, of tractors compared to oxen. A medium (45) horsepower (hp) tractor and a 9 tine tiller covers jeribs in an hour compared to a pair of oxen and a desi plough which cover the same area in about 40 hours. (In many areas of Afghanistan there are only four weeks or less between crops, and the use of tractors means that a larger area of crop can be sown in a restricted time span.)

5.8 The increase in the proportion of cash and food crops to fodder crops derives from an average

reduction of 60% in the number of work animals on farms following tractor purchase. This leads directly to a decrease in the area under fodder. A pair of oxen needs about 2 jeribs of fodder in irrigated areas. (This is a simplistic figure, complicated by the amount of crop residues available as fodder, and the altitude of the farm, but is a good enough rule of thumb).

5.9 It is often supposed that the use of tractors leads to increased yields. This is not necessarily so and has not, until recently, occurred in Pakistan. The discussion which follows involves mechanical principles, as well as the Pakistan experience, and is of some significance for Afghanistan.

5.10 The traditional ox-drawn desi plough stirs the soil to a depth of no more than ten centimetres. It does not invert the soil like a mouldboard plough and hence weeds are not completely buried. Several passes are therefore required before the seed-bed is ready for sowing. As a result the soil structure is destroyed and a fine powder is produced. When the soil is wetted with irrigation or rain water the surface seals. Thereafter its ability to hold moisture and provide good drainage and aeration, all of which are essential for crop growth, is greatly reduced. Additionally, a plough pan is formed in most soils as a result of the use of the desi plough and the continuous treading down of the soil by animal hooves. This hard pan restricts root growth and leads to low yields and low resistance to drought. The benefit of improved inputs such as high quality seed and fertiliser is negated by such conditions. Nevertheless, the desi plough is easy to make and to repair using local materials, and most of Pakistan's fields are ploughed with it.

5.11 The introduction of the tractor in Pakistan did nothing to improve this traditional method of cultivation. The tine-tiller, a light implement designed for secondary cultivation after first ploughing, is used almost exclusively with the tractor for all tillage operations. Very few deep-tillage primary cultivation implements such as the mouldboard plough, are used. The tine tiller carries out much the same operation as the desi plough and leads to the same results. The facts that the tractor and tiller combination do the operation faster, and that crops can be sown on the correct date, mean big improvements for the farmer, but nevertheless tractors are far from being used to their maximum potential.

5.12 In addition, tractors are not being operated correctly. Few Pakistani farmers, for example, use water ballast in the rear tyres or fit cast iron wheel and front end weights. Most modern tractors are built relatively lightly in order to maximize fuel economy for light operations; however, when required to carry out a heavy draught operation weights should be fitted to reduce wheel-slip and increase overall efficiency. In practice a tractor cannot pull more than 50-60% of its own weight, whatever its power. Very often, horse power is equated to pulling ability when in reality the increase in pulling ability comes from the inherently greater weight of higher horse power tractors. A general rule is that weight determines how much a tractor can pull, and horse power determines how fast the tractor can pull the implement in question. Very substantial increases in pulling ability and fuel economy can be achieved by the addition of weight ("ballast"). Ballast is needed to operate deep tillage equipment, as well as to prevent wheel-slip and excessive tyre wear.

5.13 Internationally supervised wheat trials (on farmer's farms under normal farm conditions, not in the research station) have shown that deep tillage (with the mouldboard plough) increased average yields by 36% on rainfed areas and 10% in irrigated areas, thus confirming what a few advanced Pakistani farmers had observed for several years.

5.14 Although more and more Pakistani farmers are now using deep tillage, the majority are using about half the potential pulling power of their tractors to achieve only a proportion of potential yield. (Or conversely are using a 45hp tractor to carry out the work that could be carried out by a well ballasted 25hp tractor). At the same time engine life is reduced (tractor engines are designed to run under heavy load), fuel economy suffers, and tyre life also reduced because of wheel-slip. The total cost of these factors to the nation is high, and is a matter of great concern to Government and to international lending agencies.

5.15 In Afghanistan, Russian "Belarus" tractors have a good reputation for pulling well particularly on the heavy soils which are predominant in the north of the country, a reputation which also exists in heavy soil areas of Pakistan and Bangladesh. This is because the Belarus, for its engine horsepower, is a physically large and inherently heavy tractor. For optimum performance for certain operations the Belarus also

requires ballast, but, because of its own high weight, can pull more than an equivalent, unballasted, Western-manufactured tractor of the same horsepower. Correctly ballasted, however, the equivalent Western tractor would not only outpull the Belarus but would also have a greatly reduced fuel consumption. Since most tractors in these three countries are generally used without ballast, the Belarus has established a reputation for greater pulling ability.

5.16 Studies in Pakistan supported by the World Bank and carried out by the Punjab Economic Research Institute have shown that tractors cause a small, and arguably acceptable, amount of tenant displacement. Eight percent of those interviewed gave the arrival of a tractor on their landlord's farm as the cause of leaving. Most of the rest cited better opportunities elsewhere. Inadequate or weak tenancy laws were the commonest cause of eviction against the tenant's will. (It is reported that traditional tenancy laws in Afghanistan are generally strong). The studies also show that the arrival of tractor led to a large increase in permanent and casual labour employed as a direct result of an equally large increase in cropping intensity. The proportion of hired labour to total labour was 34% on farms with tractors, and 3% on farms with oxen. It also appears from the study that tractorization has succeeded in its classic role of flattening the semi-annual labour peaks while at the same time increasing overall labour opportunities.

5.17 Up until about 1986, tractor prices in Pakistan were among the lowest in the world. Listed retail prices in Pakistan have been about half those of equivalent specification tractors in Europe or USA for the previous five years or so. Since 1985 the price has been gradually adjusted upwards (partly due to the depreciation of the US\$ and partly due to removal of Government price controls) and the price now for a 45hp tractor is Rsps150,000. The low prices prevailing historically have been due principally to three main reasons: first, intense competition between two (Massey Ferguson and Fiat) of the five licensed manufacturers/assemblers; the second reason is that there was rigid control over manufacturers' mark-ups, which was effected by restricting access to this high volume annual market of between 25,000 and 30,000 units. The third reason is the 'Deletion Programme' whereby the Pakistan Government applies a strict timetable and incentives to assembly companies to increase local content of assembled/manufactured tractors. For 45hp units (which comprise over 90% of the market) MF is 75% local content by value (according to MF), Fiat is between 50% and 60% (according to Fiat), and IMT (of Yugoslavia) is 60% (according to MF and Fiat).

Iran

5.18 Iran used to be a major assembler of 45hp tractors; however, now only 85hp tractors are assembled there. The fact that 45hp units are no longer produced suggests that the emphasis in agricultural development has shifted from the smaller farmer to the larger units. This would suggest that recent agricultural mechanization development in Iran may not be of great relevance to the problems of Afghanistan's future development.

Nepal

5.19 Except for the terai, the hot flat lowlands, tractors are rare in Nepal. Farm sizes are generally too small, and yields often too low, to support tractors. Much of Afghanistan is similar in this respect to Nepal. A large proportion of farms in the mid-hills are too small even to support oxen. Where oxen are used they are often shared or hired, as is the case, for example, in the East-Central zone of Afghanistan. The basis of Nepal's agricultural mechanization policy has therefore been to improve locally produced handtools and animal draught equipment using local blacksmiths who are well distributed in the country and close to farmers, their customers. Like Afghanistan, Nepal has highly skilled artisans already producing quality products. Nevertheless, quality can be, and is being, upgraded through further training of blacksmiths, and in supplying them with better quality steels than they previously had access to. Some of the Indian steel available for many years was of poor quality and produced low quality hand tools and animal equipment. Government policy is now to establish precise physical standards for the importation of different steels, and to provide credit (for tools, coal and steel) and training for blacksmiths.

5.20 The importance of high quality hand-tools and animal-draught equipment in Afghanistan cannot be

over-emphasised. Before the war considerable effort was made in Afghanistan to develop the Ariana plough. This is an ox-drawn mouldboard plough based on a Dutch design and was manufactured in the Jangalak factory. It was low-weight and was claimed to need low-draught. It is now manufactured in several developing countries, generally centrally in conventional factories. However some parts can also be made by rural artisans.

5.21 The French have built up substantial knowledge and expertise in the design and local manufacture of animal draught equipment, and compared to any other country, are probably the world leaders in this respect.

5.22 The Food and Agriculture Organisation of the UN has also assisted a number of countries in the establishment of several successful blacksmith training and credit projects. Their experience shows that artisanal blacksmith production in rural areas can be compatible with centralised production of, for example, animal drawn ploughs. With proper monitoring and supply of inputs, central production can produce components which cannot be made by local blacksmiths. On the other hand, although losing the benefit of mass production, central production facilities can be supplied with certain components made in rural areas and delivered to provincial assembly facilities. The centralized facilities are able to produce the more technically difficult components such as the share and beam which need heat-treating, and the mouldboard, which is a difficult shape. Such a policy may be suitable for Afghanistan in the future where provincial self-sufficiency, or near self-sufficiency, will be the target. Clearly, further study is required at the appropriate time.

6. PROPOSALS ON POLICY AND PROJECTS DURING REHABILITATION

PREAMBLE

6.1 The main conclusion which may be drawn from this report is that the shortage of farm power is indeed serious, not only for farmers now in Afghanistan, but also for both these farmers and returning refugees when repatriation begins. Unless the shortage of farm power is addressed as one of the earliest priorities, the effectiveness of other farm inputs is likely to be limited.

Labour

6.2 There is likely to be a shortage of labour for some time, unless all the refugees return en masse, and labour saving measures such as quality hand-tools and the use of crop protection chemicals would relieve this. Farmers report labour shortages to be particularly acute in Baghlan, Takhar, Kunduz, Balkh, Nimgrehar, and Herat, and to a lesser extent, Faryab and Ghazni.

Draught Oxen

6.3 Natural regeneration of oxen will take a long time, and for several provinces that period is too long to even consider for inclusion in any serious short or medium term plan. Several provinces, (specifically, Baghlan [18 years], Balkh [14], Kunduz [12], Jowzjan [22], Paktia [24], Kabul [26], Parwan [25], Logar [14], Wardak [14], Ghazni [43], Zabul [62], Paktika [30], Helmand [42], Kandahar [a mind-numbing 70 years], Nimroz [27], Uruzgan [19], Herat [14], Farah [25]) will take more than 10 years for natural regeneration of draught oxen. This figure is only for farmers who stayed in Afghanistan, and takes no account of the majority of refugee farmers who necessarily must return with no oxen at all.

6.4 Procurement of oxen from Pakistan and Iran is possible but is likely to meet only a small part of the need if, as calculated in para. 6.14. below, at least half a million animals are needed to make up the losses.

6.5 The list of provinces where farmers have expressed a particular need for power for land preparation is a little different from the "regeneration" list above, because in some provinces animal draught was already tight before the war. In Paktia, Parwan, Logar, Wardak, Paktika, and Helmand, farmers have identified power for land preparation as a particularly pressing problem.

Tractors and other powered equipment

6.6 The use of tractors to replace oxen is possible and practical in certain provinces where the topography allows this, where tractors were already in use before the war, or have been introduced during the war, and where yields, or potential yields, can support the higher cost of tractors, or, where yields are low, where there are alternative income sources for tractors such as transport and threshing. The use of tractors is, in most areas of Afghanistan, the only practical alternative to oxen for land preparation for the foreseeable future.

PROJECTS TO SUPPORT LABOUR SHORTAGE

The use of herbicides

6.7 The survey has identified that in a number of provinces weeds are becoming a severe problem. Herbicides can be used in two main ways. First, in areas which have been left fallow annual and woody weeds are often a severe problem requiring much labour to clear before the plough can be used. The use of desiccants would be appropriate in many cases. However, they should be seen as an emergency measure for subsidised use under supervision by trained extensionists, and their cost has prevented them from being used on a wide scale by small farmers in Pakistan. Their use is also entirely experimental and should be approached with caution (but see also para. 6.10 below).

6.8. Second, broad-leaved weeds in wheat are also becoming severe and are partly responsible for reduced yields. Before the war these were generally hand-picked and fed to animals. Where labour is not available for this, and there is not the added incentive provided by the need to feed animals, the use of selective herbicides in wheat, maize and barley can be useful. The survey shows that in provinces where hired labour has not been reduced, the number of farmers using hired labour for maize has actually increased during the war, e.g. in Pakia. This indicates that the weed problem may have become greater. It also indicates that if labour were as available as it is in Pakia (in fact in most provinces it has become scarce) then we would see the same happening in most other provinces.

6.9 One of the first conclusions after the first year of the Survey, even before the results had been fully analysed, was that the weed problem in cereals was acute. Accordingly, an extension and herbicide delivery pilot project was started at the beginning of the following growing season (Spring 1988) and has been enthusiastically received by farmers. Herbicide concentrate was packed into rigid plastic knapsack sprayers which were then loaded onto horses, generally two to a horse, and then delivered by the extension agent and demonstrated to farmers. Farmers were required only to supply water to mix the concentrate with. The supply and use of certain herbicides has thus now been successfully tested as a pilot project, and is now being continued as a wider pilot project by the ASA using UNDP funds. This project aims to reach a modest 4,000 farm families each year during the three years 1989 to 1991. There is thus ample scope for other aid agencies to reach more farmers with similar projects. The much easier transport and distribution conditions which now seem to prevail, make this possible at much lower cost.

6.10 Although the pilot project has only demonstrated the use of selective weedkillers in graminaceous crops (wheat, maize, etc.), and the use of insecticides, fungicides and rodenticides, the use of total-spectrum systemic desiccants such as glyphosate (a tradename is Round-up), and non-systemic desiccants such as paraquat (a tradename is Grammoxone), and selective killers of broadleaved woody weeds such as 2,4,5-T cocktails are likely to be useful in clearing tall weeds on abandoned farms before the plough can be used. These are scheduled to be tested in the 1989 season by the ASA.

Improved hand tools

6.11 The importance of high quality hand-tools for this type of agriculture cannot be emphasised too much, and this quality depends largely on the quality of steel available to blacksmiths. This subject is dealt with later in this Chapter. In addition to the supply of hand tools, farmers will need credit for the first season at least. Supply of hand tools at the beginning of the repatriation phase may have to be externally sourced, as local blacksmiths will not be able to supply the demand. Care should be taken that these tools are at least locally repairable by blacksmiths.

Food-for-work, cash-for-work and the link with tractor lending

6.12 Many returning refugees will require food-for-work, or at least food support, for the first season, as one would expect in such circumstances. In some circumstances they will also require cash-for-work in order to pay for tractor hire services. The results of the survey show in which provinces custom hire tractor services are predominant, and where tractor hire services are not available. The survey results can also provide useful indications of where lending for tractors is likely to generate an income (to repay tractor loans) from farmers who are used to hiring them, and where hiring is not practised. The situation is not at all uniform across the country, and the balance of food-for-work, cash-for-work, medium term loans for tractor purchase, and seasonal loans for tractor hire, have to be tailored for each province. The important point is that the application of food-for-work and cash-for-work must not be confused with each other. In other words if there is a tradition of tractor or oxen hire in a certain province, then there is likely to be a demand for cash to pay for ploughing services during the rehabilitation phase. In other provinces there may be a greater need for food. Often a combination of the two may be required.

PROJECTS TO SUPPORT OXEN

Oxen procurement

6.13 The survey shows:

- a) that there are some provinces which have hardly lost any oxen at all, e.g. Badghis^{1/};
- b) that there are some provinces, e.g. Laghman, which have also lost few animals but, because the farm power situation was already tight, feel those losses more keenly than other provinces with equivalent losses;
- c) that there are some provinces, e.g. Helmand and Kandahar, which have lost many oxen but nevertheless have the option of using tractors;
- d) that some provinces do not have the option of using tractors, at least not immediately, because they have no history of tractor use, e.g. Kapisa or perhaps never because of other factors such as farm size or access, e.g. Parwan, or steepness, e.g. Kunar.

6.14 With this background there is clearly a need and the scope for a certain amount of procurement and internal distribution. The animal disease problem and its possible distribution has to be taken account of, and the survey does have some information on this. For example, farmers in Bamyan and Laghman, and to a lesser extent, Paktia and Paktika, reported that animal diseases were an important problem. The Survey did not go into further detail than this, and clearly there has to be a more thorough study of the local procurement and a animal disease picture.

6.15 The area ploughed by a pair of oxen varies (see Table Fp2t1) but the (arbitrarily) weighted average is 32 jeribs^{2/}. If there were 20 million jeribs cultivated in 1978 (as reported by the Central Statistics Office, Kabul - see ASA First Report) then there were 1.25 million pairs of oxen at that time (ignoring the small use of tractors). (We guessed 1.2 million in the First Report, para 4.5, before analysing the results of the Survey). The calculation can also be made in another way, as follows: the CSO also reported that there were 1.2 million farm families in 1978; Table Fp2t1 indicates that the (weighted) average farm family had 0.9 pairs of oxen; the Survey shows that about 70% of farmers had their own oxen; then there were 750,000 pairs. If, as the survey indicates, draught oxen have been reduced by 40%, then the shortfall is 250,000 to 300,000 pairs, or 500,000 to 600,000 animals.

6.16 Even if this large volume of animals could be procured, there are several other factors for consideration which, taken together, indicate why no (Pakistan-based) organisation has yet demonstrated that the delivery of large numbers of oxen is feasible. Furthermore, even if this could be demonstrated as feasible through a pilot project, the type of animals available in Pakistan are often not suitable for or adapted to the altitude and cold of many regions of Afghanistan, and perform poorly as a result. One NGO with experience of the delivery of oxen to Afghanistan considers that only the small and hardier animals from Northern Pakistan are suitable, and further estimates that a maximum of 1,000 animals a month could be procured. This is well below the numbers needed. Finally, fodder grown for oxen has to compete for limited resources such as labour, land and irrigation during the early part of the the rehabilitation phase. There is some scope for procurement from within Afghanistan, from those provinces which are least

¹ However, the Survey did not cover abandoned farms, or take into account refugee farmers, so this statement should be treated with caution, and the figures used only for comparison between the provinces.

² This figure is derived from the Survey results and is affected by the amount of dryland agriculture in a province, and by the number of tractors. The figure has been derived simply by dividing the area under cultivation on each farm by the number of pairs of oxen in the farm. The figure of 25 jeribs given elsewhere in the report is the assumed actual area ploughed each year by a pair of oxen, a figure which omits the effect of tractor use in conjunction with oxen.

affected to agro-ecologically similar regions which have been more affected, but the Survey indicates that the scope for this is very limited. In fact, there are only four provinces where the natural regeneration for oxen is less than five years ^{1/}.

Veterinary Services

6.17 It would be logical to invest effort and money in keeping alive and healthy the oxen (indeed all cattle) which are left, and possibly to increase their regeneration rate. However, FAO report that it would be difficult to raise this above 3% annually, and the regeneration calculations given in Chapter 3 are based on this figure. The training of para-vets is being undertaken by the SCA and the Dutch Committee with the aim of controlling the major animal diseases, mainly through vaccination. They are running two courses a year of 5 months each for 25 trainees in each course, as well as two short courses for one month for vaccinators for the same number of trainees. French veterinarians and the German Afghanistan Foundation have also been active in this field.

Single ox equipment and harnesses

6.18 There are an increasing number of countries where pressure on land has meant that farmers are normally able to keep only one draught animal, and this is, to a certain extent, already the case in the East-Central zone and parts of the South-West zone of Afghanistan. However, the small size of draught animals, about 350kg at 4 years when they are ready for work, makes them unsuitable for single use except on the lightest soils. The Ariana ploughs developed and manufactured in Afghanistan and distributed through the ADB (see para 5.20.) are used mainly in the North (Balkh, Kunduz, and Baghlan) and always with two horses or oxen. Horses are used exclusively in the North and generally in the lighter rainfed areas, and again always in pairs, while oxen, being stronger than horses (in Afghanistan) are used on the heavier soils in the irrigated areas. Single camels may be used occasionally. It seems most unlikely that the use of single draught oxen or horses would be successful in Afghanistan.

The Use of Herbicides

6.19 This subject has already been discussed in the context of labour-saving projects, but are also relevant for oxen-saving projects. More specifically, the complementary use of crop protection chemicals can release oxen for cultivation of a larger area than they covered in the past. In normal circumstances in Afghanistan, several passes are made with the plough before sowing, and 5 passes are not uncommon. For wheat, the commonest crop, two ploughings followed by harrowing are normal and a fairly rough seed bed is acceptable. For maize, the stubble is generally ploughed under, and then there are two more ploughings in each direction, followed by levelling and harrowing. Rice is also ploughed twice at least. For sesame, linseed, cotton and sugarcane, five ploughings are common. However, the reason for this multiple ploughing is generally to control small germinating weed seedlings which would compete with the crop if sown after the first ploughing. Only where seed is very small, such as sesame, is there a need for a fine seedbed. For most crops and most soils, the use of herbicides after the physical preparation of the seedbed, normally achievable with one pass with the plough and one with the harrow, can substitute for the drudgery of multiple ploughing, and release oxen (and tractors) to plough a wider area. The main reasons why herbicides have not been used up to now is cost, lack of extension, and availability. It is recommended, therefore, that their use during the rehabilitation period should be subsidised. It is foreseen that the use of many herbicides, particularly those which would substitute for ploughing, would cease on the basis of cost as soon as the subsidy would be removed. In Pakistan and other neighbouring countries the use of herbicides is largely confined to selective compounds in cereals. It should also be pointed out that the use of herbicides to assist with land preparation is not proven in Afghanistan, is speculative and experimental, and should therefore be approached with caution.

^{1/} These are Laghman (3), Kunar (4), Kapisa (4), and Badghis (0), but these figures refer to farmers in Afghanistan only, and do not take account of returning refugees.

PROJECTS TO SUPPORT BLACKSMITHING

Materials supply, Credit, and Training

6.20 Types of steel required and regionally available should be investigated. Ordinary mild steel is not ideal for most agricultural tools. Supplies of coal from Pul-i-Khumri mine in Baghlan province have not been much available outside Kabul during the war but the mine is still operating and supplies may be more widely available in the future. In the rural areas, however, charcoal is mainly used. Credit for these supplies when blacksmiths set up business again is important, as well as training. Blacksmith training in the refugee camps in Pakistan, notably with support from Holland among other countries, has progressed for several years. Paras. 5.19. to 5.21. discuss certain strategies for projects to support blacksmithing, and the main conclusion is that it is generally the organisation of distribution, and supply and demand of finished wholegoods and components which has the most impact on the establishment of a successful blacksmith industry.

PROJECTS TO SUPPORT TRACTORS AND OTHER POWERED EQUIPMENT

Credit

6.21 Credit for tractors was available before the war from the Agricultural Development Bank (ADB) as well as from traditional sources, and has also been available during the war from some of the NGOs based in Peshawar.

a) The Agricultural Development Bank^{1/}

6.22 The ADB was established in 1954 and had grown into a successful lending institution by 1979. In that year it disbursed over Afs 1 billion, and had a total loan portfolio of Afs 2.5 billion with 94,000 loans per annum. It was estimated that the ADB reached 2% of the rural population. During the 10 year period up to 1979 the ADB received IDA credits totalling US\$30 million, USAID \$5 million, Canada C\$5 million, Iran US\$2 million, and UK Pds0.5 million. A further credit request for US\$50 million was submitted to IDA at the end of 1979 but was not appraised.

6.23. By 1980 the ADB had 14 main branches and 6 sub-branches throughout the country, with a trained professional staff of 700 (although most of these are now reported to be in Pakistan).

6.24. From 1979 Government insisted that emphasis be given to lending to cooperatives rather than to individuals, and as a result the bank went from being an independently managed and financially sound and well organised credit institution to an instrument of Government which forced it into new lending activities for which it was not trained or prepared. Lending to cooperatives quadrupled in one year, from Afs 116 million in 1978 to Afs 444 million in 1979, while lending to individuals nearly halved, from Afs 671 million to Afs 370 million.

6.25. As far as farm power is concerned the ADB had a profound effect on the promotion of tractors and other farm machinery. In 1969 the lending programme of the ADB which included nor short term production loans had come almost to a complete standstill. The ADB reactivated its lending activities by starting in a field where emphasis had been before - tractors and pumps. In 1970 the first batch of tractor loans started with 50 Massey-Ferguson and 100 Belarus imported by the ADB.

6.26. Ten years later in 1979 there were 94,000 loans of which 97% (by number) and 54% (by value) were

^{1.} Much of the information given in this section is derived from the Final Report of 1980 by Hendrikson Associates Consultants GmbH of West Germany who were contracted to UNDP and World Bank for the ADB. UNDP made this report available to the ASA.

disbursed for fertiliser and seed. Farm mechanisation (mainly tractors) consumed AfS 238 million or 24% of the total value of loans. One percent by value was for the category called "On-farm Development" which included draught oxen among seven other sub-categories. The remaining 21% by value were for investment in agro-business, cotton companies, and other enterprises which also included farm mechanisation such as tractors and combine harvesters.

6.27. Between 1969 and 1975 the ADB Supply Department procured 600 Belarus tractors from Russia, 450 MF tractors from England, 400 Escort (Ford) tractors from India, and 40 bulldozers and 7 combines from Russia. All tractors were ordered with a package of implements and spares.

6.28. From 1975 the Supply Department of the ADB was assisted by an FAO team, and between 1975 and 1979 400 MF tractors from UK and 530 Belarus were procured. During the nine years from 1970 a total of some 2,500 tractors were procured. Almost exclusively they were 45hp, although some of the Belarus were of a higher horsepower than this. (This is also more or less the case in Pakistan, incidentally, where tractors bigger than 45hp take less than 10% of the market, and are mainly for the large sugarcane farms of Sind).

6.29. Lending terms for medium term loans (for agricultural machinery) were 20% deposit and 8% interest over five years with one year of grace. For seasonal loans the interest rate was 10%. The interest rates were unsubsidised commercial rates and recovery rates were good.^{1/} Surety for tractor loans (after 1970) were not based on land ownership or the ancient system of land and water rights in Afghanistan, but promissory notes (registered and unregistered) and chattel mortgages were used instead, plus personal assurances from five Guarantors, and the certificate registered at the appropriate Court office. Farmers had to demonstrate that their farms were a minimum of 100 jeribs or 20ha. In the event that an applicant was unable to satisfy the terms and conditions of a chattel mortgage, then the loan could be in the name of more than one person, and it was not uncommon to have up to three names on the agreement. In other words there was joint and several liability.

6.30. The important thing was to have a good appraisal and good supervision of the loanee, and this was achieved through properly trained Mobile Credit Officers (MCOs). In fact, the level of repossessions was very low. The ADB was also remarkably successful in by-passing red tape and, through the surety conditions described above, and close loan supervision, made loans more and more available to small and medium size farmers, as opposed to large farmers as was the case under earlier surety rules which depended on land title. The ADB also made loans available to landless farmers, and in this respect was 'ahead of' the ADBP in Pakistan which has for several years been talking about the need to make tractor loans available to the landless or non-farmers (i.e. to people who want to be tractor contract operators but not farmers) but has still not introduced this facility.

6.31 ADB's Supply Division set up Supply Centres in the main cities for the distribution and servicing of agricultural machinery and equipment. These worked closely with the appointed distributors, and in the case of Massey-Ferguson at least, these were State-owned.

6.32 Because the ADB was supported by UNDP and the World Bank, the procurement of tractors and other agricultural machinery was by international competitive bidding. MF and Belarus dominated the market, and MF tractors are now found mainly in the south of the country, and Belarus are found mainly in the north, largely as a result of these tenders which were regionally based, but also for obvious geographical reasons, and because of the heavier soils in the north (see also para. 5.15.).

1. Subsidies have not had a demonstrably beneficial effect on tractor loans either in Afghanistan or Pakistan. This is not to say the subsidies on tractor prices are inappropriate, although in Afghanistan prices were not subsidised either.

b) Pakistan-based NGOs

6.33 At least five NGOs are supplying tractors to Afghanistan as part of their humanitarian aid programmes. One of them has supplied 15 MF240s during 1987/88 to different provinces. The arrangement is that they are on loan to the shuras which allocate their time and collect rents which are monitored by the NGO. The same NGO logically places emphasis on the promotion of stationary threshers and other equipment to ease the critical power shortage between the harvest of the winter wheat crop and the planting of the summer crop. A total of 26 threshers of 1t/hr capacity fitted with a 40hp engine have been sent in during the same period, and 75 before this period (by the NGO mentioned above. There are reports of 300 threshers sent in by other agencies). It will be appreciated from the discussion in this report that stationary threshers directly release draught oxen from the traditional threshing-by-trampling method for land preparation work.

6.34 Another NGO has supplied three Belarus tractors in Takar and another in Kunduz. They have been provided free to individuals presumably in return for cooperation in other aspects of aid projects in the same area¹.

6.35 There is a growing tendency now among NGOs to believe that tractors and other machinery should not be given free to individuals, and they believe that individuals, not shuras, should own and operate them. This report agrees with this approach. The shura should certainly become involved, for example by guaranteeing that a certain minimum area is contracted for ploughing during the year so that loans can be repaid, and also to establish a farmer's social standing in the community. However, some NGOs are continuing to lend or make grants to shuras. In future, some NGOs believe, and this report supports this view, that the emphasis should be on the provision of credit for farm machinery.

c) Outline Proposal for an Agricultural Credit Programme

Background

6.36. This proposal is inserted in this report because it is foreseen that any credit programme that is started would inevitably disburse the major part of its credit funds on farm machinery or oxen. Historically this was the case with the ADB before the war, and this report argues that farm power is the most pressing problem facing most returning farmers.

6.37 Some NGOs have established during the war a considerable amount of stored knowledge and expertise in the checking of individual Afghans for authenticity and standing in their communities. In the case of the Swedish Committee for Afghanistan, the accumulation of information and the sophistication of its use exceeds anything that any formal credit organisation, starting from new, could hope to achieve in less than five years. The ADB in Kabul has, according to reports, catered mainly for sympathisers of the regime rather than for farmers in the free areas, so their information is largely irrelevant. Further reports say that a large proportion of their trained staff are refugees in Pakistan.

6.38. There is scope for using this checking system and accumulated knowledge developed by the NGOs as the basis of a formal credit system, in the event that the interim period before the establishment of a broadly acceptable Government in Kabul is prolonged. The lending operations of the ADB before the war were successful precisely because of the thoroughness of appraisal of individual applicants. The success of NGOs is based on exactly the same thoroughness of appraisal. NGOs could take a common approach to credit, and could act as agents for the agricultural credit programme (ACP). Funds for the programme

¹ It should be noted in passing here that there is no technical reason why Western aid agencies should be coy about promoting Russian tractors, although it is understandable that they may receive a bad press for doing so. A Fiat or MF in the North, or a Belarus in the South would be an orphan without easy access to parts and service (unless these are also supplied by the agency). Any of these tractors, however, as long as they are correctly specified, can perform equally well in either zone (see also para 5.15).

would be provided from bilateral or other aid sources. The NGOs could move their "branch offices" into Afghanistan according to circumstances, eventually hopefully establishing themselves with their trained staff in Kabul, when it could assist a rejuvenated ADB proper.

6.39. Farmers still living in Afghanistan and returning refugees need agricultural inputs such as seed, crop protection chemicals, fertiliser, tools, and farm machinery services (i.e. the opportunity to hire tractors or threshers) or farm machinery (i.e. the opportunity to own tractors, threshers or knapsack sprayers).

6.40. Farmers in Afghanistan obtain these locally for cash, or in Pakistan for cash, or, to a very small extent from aid agencies free or subsidised. Where any farmer pays cash at the beginning of the season for inputs there is the opportunity for assisting him with credit. Or, put another way, if credit is not available for small farmers (often tenants or sharecroppers) who need inputs at the beginning of the season, then if they do not have the cash resources they have to use traditional credit sources (in cash or kind), or forego growing the crop. By using traditional credit sources they often do not have the opportunity to break out of the poverty cycle which keeps them in debt to a landlord or moneylender.

6.41. Agricultural credit can often make the maximum use of the logistical and physical resources of the landlord (such as in the provision of tractor services, or physically obtaining fertiliser or seed wherever it is available and delivering it to his tenants) and yet at the same time provide the tenant or sharecropper with the opportunity of becoming less tied to his landlord.

6.42. Two types of credit are needed. First, seasonal credit for the small farmer to purchase inputs for a particular crop which is then repaid immediately after harvest of the crop. Obviously, this has to be a cash crop, or partial cash crop. If it is wheat, he has to sell enough to repay the cash cost of inputs plus the interest charge. Second, medium or long term credit for the larger farmer or landlord to obtain, say, a tractor or thresher with which he can provide services to his tenants, sharecroppers or neighbours, and thus an income with which to repay his loan. Clearly, these two types of loans are mutually dependent. A seasonal loan to a small farmer to pay for tractor services, for example, ends up as the income for the larger farmer and his tractor with which he pays his loan.

6.43. (It should be mentioned here in passing that medium or long term loans are relatively easy and cheap to administer, though they obviously require careful checking and supervision. Seasonal loans require more effort and are costly to administer to the extent that in many countries these administrative costs have to be heavily subsidised for several years)

6.44. To administer an agricultural inputs programme in Afghanistan, aid agencies have the cash resources, they may also have the expertise, but their greatest difficulty seems to be the logistical capability of physical delivery to farmers. Yet larger farmers, generally the landlords, had and generally still have the incentive, the resources, and the necessary local contacts to deliver inputs and services to their tenants and sharecroppers at the beginning of each crop season. Their very position in rural society depends on their efficient performance of these traditional responsibilities.

6.45. Notwithstanding the need to reach the smaller farmer, any delivery programme and credit project would probably have to be biased towards the larger farmers with medium term credit. At a later stage when the logistics of physical delivery of inputs inside Afghanistan become easier, the emphasis could change to seasonal credit to smaller farmers. However, the extent to which this would turn out to be true or not would depend entirely on market forces. Both would be tried together, and the project would supply what the customers demand.

6.46. It is envisaged that the ACP would eventually be absorbed into a rejuvenated ADB, and the Mobile Credit Officers (MCOs) who would be trained under the ACP would become its permanent staff. This could be used as a weapon against customers, in that it would be impressed on them that any default by any individual or shura would become part of the ADB's records and would count against them in the future.

Components

6.47. An Agricultural Credit Programme (ACP) would be established in Peshawar. It would consist of a General Manager who would oversee the whole programme and would have particular responsibility for the Intelligence and Checking Department (ICD), an Agricultural Credit Manager in charge of MCOs and of physical stocks and stock movement, and a Procurement Manager in charge of the procurement and delivery of goods to the yard.

6.48. The ACP would consist of an office in Peshawar and a bonded stock yard for holding inputs such as fertiliser, seeds, crop protection chemicals, knapsack sprayers, animal drawn implements, steel and other inputs for blacksmiths, threshers, tractors and tractor implements. Oxen would not be held at the yard but would be purchased direct off farms in Pakistan under the supervision of MCOs.

6.49. The ACP would hold and deal in Pakistani Rupees and Afghanis. It would charge commercial interest rates which might be different according to which currency is used. The Administration and MCOs would be paid for as a grant by a donor agency. Income would be put into a Revolving Fund which would be used for the replenishment of goods.

6.50. Customers of seasonal inputs such as seed, fertiliser, and crop protection chemicals might receive grants towards the cost of transport between Peshawar and the final destination in Afghanistan but the customer would be responsible for the physical transport and for repaying the loan. Surety would depend on guarantees given by the shura, and on the checking procedure of the ICD.

6.51. Customers of tractors and threshers would be required to put down a deposit of, say, 30%. Surety would depend on written contracts with other farmers to plough their land, guaranteed by the shura, and perhaps by the commander. Repayments might have to be tailored to the physical ability of farmers to visit Peshawar, at least in the early part of the project and depending on the political situation. Every two to three months would be sufficient for farmers near Peshawar. More distant farmers would have to be less frequent in their repayments. As soon as possible, satellite offices would be established in the major towns in Afghanistan for the collection of interest payments and as a base for the MCOs.

6.52. For at least the first year of operations the ACP would confine its operations to a maximum of three provinces in which it would try to achieve a fairly dense level of credit service and the tightest level of supervision.

Organisation and Management

6.53. In providing tractors and threshers and other similar income-generating inputs, the growing tendency among NGOs is to operate through the shuras, or village councils. Another NGO, additional to the two mentioned above, providing mainly water pumps in three main areas, Kandahar, Logar, and Ghazni, has found that providing inputs through commanders was a mistake. Their rule now is to lend or make grants to shuras in which farmers actively participate. An important aspect of the use of the shuras in lending or donating tractors is the community responsibility on which it depends, and which could be used as a vehicle for more formal lending in the future. A shura would also have little problem in identifying the 100 jobs on which the loanee would be contracted to provide ploughing services. The ADB experience was that this was crucial in providing sufficient rental income to repay the loan.

6.54. There is no evidence in Afghanistan or elsewhere that institutionalised tractor hire services, even as a temporary measure during the repatriation period, have any merit. Nor have they worked anywhere else in the world. The main argument against them is that they suppress the emergence of private contractors or farmers who would provide the same service, that in striving for 'efficiency' there is a tendency to subsidise

the operation, overtly or covertly, thus undercutting any existing services^{1/}, and, finally, there is the problem of withdrawing the service at some point in the future when farmers have modified their farming systems in the expectation of the continuation of the service. Additionally, machinery cooperatives had a bad start in Afghanistan and were not successful. These also have rarely worked in other developing countries. Aid agencies are advised to exercise extreme caution if they consider providing tractor service themselves.

6.55 The provision of any input or service in relation to the mechanisation of agriculture must take account of the eventual aim as far as organisation and management is concerned. That is that machinery should be privately owned and operated, and that the smaller farmers' access to this machinery should not be through smaller machines (see para 6.34. below) or cooperative use, but through private custom hire. Further aim should be that services to support farm machinery are through private licensed agents.

6.56 The provision, either by grant or loan, of tractors to relatively wealthy farmers has been practised by some NGOs because, they say, this is the easiest way to operate in Afghanistan and one that upsets the status quo least. Champions of the smaller farmer, and the NGOs who may receive their criticism, should look at the Survey results on changes in the use of farm power. In a few provinces large farmers use their own tractors on their own farms. In the majority of provinces, tractor owners plough for many other including small farmers. However, the evidence from Pakistan is that farmers buying tractors may, to small extent, take in hand land that would otherwise be made available to sharecroppers or tenants. The conclusion is that lending to large farmers for tractor purchase is not altogether a bad idea, and is certainly acceptable given the difficulties of operating in time of war. It is also important not to forget that for the majority of Afghans the war was mainly about the right to preserve their agricultural feudal system, and an aid intervention should respect this.

Tractor and Equipment Specifications, and Procurement Considerations.

6.57 It has already been mentioned that mouldboard ploughs are the usual implement used for land cultivation with tractors in Afghanistan. Except for some light and stoney soils in the rainfed areas, in some areas near the border with Pakistan, all land in Afghanistan is cultivated with the mouldboard plough (where tractors are used)^{2/}. This is in sharp contrast to Pakistan where the use of the tractor with tine-tiller is almost universal. It follows from this and the discussion in Chapter 6 that all tractors should be purchased with full ballast, i.e. front and rear wheel weights, and a valve for filling the rear tyres with water.^{3/} Secondary tillage equipment (i.e. the tine tiller), and a trailer should normally also be supplied in the total package. As a rough guide, a two furrow mouldboard plough costs about Rps8,000, and a tillage about Rps6,000.

6.58 Without being alarmist, it is probably helpful to point out that to export tractors, even informally, from Pakistan to any country, including Afghanistan, is in violation of the agreements between the major international tractor manufacturers and the Government of Pakistan. Obviously, the very few tractors exported (in relation to the 25,000 annual market in Pakistan) may be ignored for the present by the international licensees, the local manufacturers, and the Pakistan Government, but logically there will come a time when the law will be applied. The logic is as follows.

1. One NGO has already done this, according to reports, with predictable results.

2. This information is derived from informal reports and not from the Survey.

3. A possible strategy for persuading operators of the need to fill the tyres with water, particularly since the valves needed are difficult to find on the market in Pakistan and may often be reckoned by the person in charge of procurement to be not worth the trouble (though they are simple to make), is to point out that they have some effect in absorbing the blast of anti-personnel mines which are common in some farming areas. In the war for the independence of Zimbabwe, water ballast was apparently used for this reason.

6.59 It has already been stated that the price in Pakistan of tractors of equivalent specification has been about half the retail price of Europe or the USA, and often even less than this in some international markets, and that the local content of some of these tractors is 75%. It would clearly not have been in the international manufacturers' interests to license local manufacturers to export that 75% at prices which would drastically undercut the international market, where the international manufacturer was only receiving 25%.

6.60 In fact, with the recent large price increases of tractors in Pakistan, it is possible that the two main manufacturers would only win international competitive bids which may be issued by any future Government of Afghanistan by sourcing from their manufacturing facilities in Turkey (MF and Fiat) or Poland (MF). There is, incidentally, little problem now with parts commonality for the major international manufacturers, and sourcing would depend mainly on quality of local manufacture, price, and logistics of support. Such support would have to be through the licensed agents of the manufacturers. As a rough guide, the price of a 45hp tractor in Pakistan is now about Rps150,000 c/c Peshawar.

6.61 Threshers should normally be self-powered with their own engines so that tractors are free for tillage work during the mid-summer power peak. These are not available on the free market in Pakistan, however, and have to be specially ordered, or imported from India where 5-20hp models are available. One NGO has been trying to import self-powered threshers from India without success. A UN agency such as FAO could probably do this more easily. Types available in Pakistan take pto power from tractors. Faisalabad and Lahore are the main centres of manufacture of threshers. The 40hp 1t/hr models cost about Rps30,000 ex-works.

6.62 Silsoe College in UK and the Pakistan Agricultural Research Council (PARC) have collaborated in producing a whole crop harvester which collects, obviously, the straw and the grain together. When threshed, the collected crop produces 'busa' (finely split straw, which forms the main ration of the average ox in Afghanistan) as well as grain and the whole system therefore does not have the disadvantage of other threshers which produce whole straw. This has promise and has worked well in trials but cannot yet be regarded as proven. Until these go into volume manufacture they will be expensive, and a pilot project is needed to build a few to test and hopefully create the demand. Present approximate cost is Rps200,000. It is important that aid agencies regard this system as entirely experimental.

6.63 Small portable powered threshers have been developed in the Philippines and are available on the world market which might have application in Afghanistan. They can be transported by two men or a pack animal and are designed for remote areas. They too, however, must be regarded as experimental in the Afghanistan context for the present.

6.64 A similar comment can be made for single-axe tractors (often known as walk-behind tractors, or two-wheel tillers) and small (20hp) double axle tractors. There is no evidence to suggest that they would be successful in Afghanistan. Any tillage operation requires the same amount of power, regardless of the size or power of the machine pulling the implement. Below 40hp the cost per useable hp is much higher than with higher hp tractors. Such tractors are suitable in, for example, Japan and Italy, where input and output costs are different (often as a result of massive subsidies and other distortions) from Afghanistan and Pakistan. In Japan, for example, a farmer has to sell a ton of paddy to purchase a single-axe tractor, whereas in Pakistan a farmer has to sell 10 tons. In other words, the Japanese or Italian farmer (many of whom are 'weekend farmers') can afford to disregard the true cost factor in favour of convenience of timeliness, and often without the opportunity of using a hired tractor of conventional size.

6.65 Smallness of size of farms as an argument for single-axe and 20hp double axle tractors becomes valid only in the most confined spaces and awkward shaped fields, which are found in certain mountainous provinces of Afghanistan. Field access is generally a more valid argument where terraced agriculture and conventional size tractors come together for the first time and machines may even have to be lifted from terrace to terrace. In the longer term, however, where physical conditions permit, field access is generally modified to allow access for normal size tractors.

Support Services

6.66 Private enterprise support services will tend to follow the tractors during the repatriation period. After that it is expected that the licensed distributors, possibly together with the Supply Centres established by AMSCO (The Agricultural Machinery and Service Company), a subsidiary of the ADB the mid-1970s, will be revived. Probably the best course of action for any aid agency is to provide the raw material for both of these systems, indeed for any system - that is trained mechanics and other support service personnel. The Belgian Government is supporting such a programme in Peshawar. The ILO is also providing support.

ANNEX 1.
SAMPLE OF ONE PROVINCE ONLY

GHAZNI PROVINCE

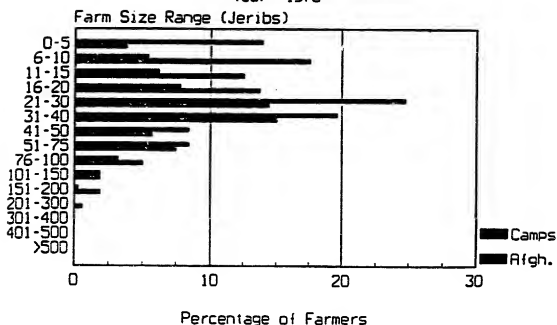
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GHAZNI

Distribution of Farm Size
Province: Ghazni
Year: 1978



<u>Farmers in Afghanistan</u>	<u>1978</u>	<u>1987</u>
Total Number of Farms	371	366
Average Area	31.08	19.46
Average Area Irrigated	29.75	18.27
Average Dryland Area	10.14	3.47

<u>Farmers who left in 1987</u>		
Total Number of Farms	159	1
Average Area	33.90	8.00
Average Area Irrigated	28.00	8.00
Average Dryland Area	20.44	-

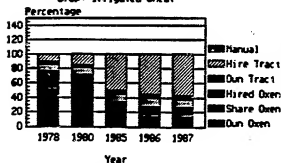
<u>Average of Both Groups</u>		
Provincial Average Area	31.93	19.43
Provincial Average Irrigated Area	29.22	18.24
Provincial Average Dryland Area	14.78	3.47

(All areas in Jeribs. 5 Jeribs = 1 Hectare)

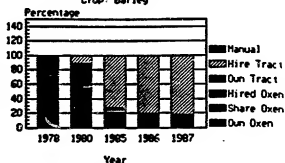
FARM POWER UTILIZATION

Province: Ghazni

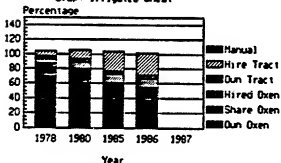
Farm Power - Farmers in Afghanistan
Province of Ghazni
Crop: Irrigated Wheat



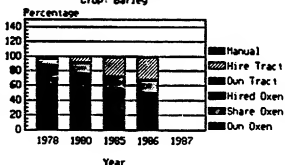
Farm Power - Farmers in Afghanistan
Province of Ghazni
Crop: Barley



Farm Power - Farmers who left in 1987
Province of Ghazni
Crop: Irrigated Wheat



Farm Power - Farmers who left in 1987
Province of Ghazni
Crop: Barley



Base Figures for above graphs

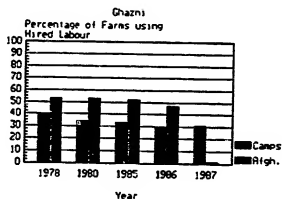
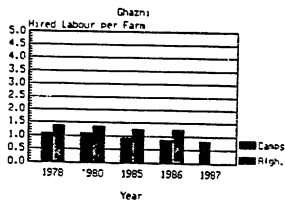
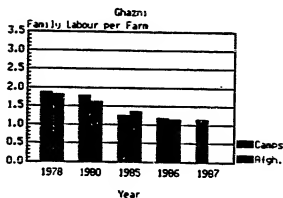
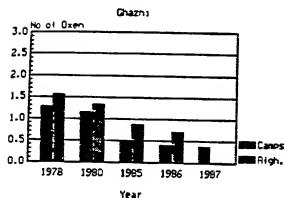
Province: Ghazni

Farmers in Afghanistan

		1978	1980	1985	1986	1987
Irr.Wheat	Own Oxen	50.56	43.06	16.71	13.37	13.03
	Shared Oxen	24.72	28.06	16.99	13.65	13.31
	Hired Oxen	10.28	10.56	11.70	12.53	11.05
	Own Tractor	3.33	3.06	4.18	4.74	5.10
	Hired Tractor	11.11	25.56	50.97	55.99	58.07
	Manual Means	-	-	-	-	-
Barley	Own Oxen	69.48	53.90	11.28	9.17	9.52
	Shared Oxen	25.32	31.82	9.02	2.75	1.90
	Hired Oxen	1.95	1.95	4.51	2.75	1.90
	Own Tractor	1.30	.65	2.26	3.67	3.81
	Hired Tractor	1.30	11.04	72.93	81.65	82.86
	Manual Means	-	-	-	-	-

Farmers who left in 1987

Irr.Wheat	Own Oxen	69.38	60.38	37.50	36.76	-
	Shared Oxen	16.88	18.87	22.50	17.65	-
	Hired Oxen	6.25	8.81	12.50	11.76	-
	Own Tractor	4.38	4.40	3.75	4.41	-
	Hired Tractor	7.50	12.58	26.88	30.88	-
	Manual Means	-	.63	.63	.74	-
Barley	Own Oxen	70.00	57.35	27.69	26.79	-
	Shared Oxen	17.14	19.12	27.69	23.21	-
	Hired Oxen	8.57	13.24	15.38	16.07	-
	Own Tractor	1.43	1.47	1.54	1.79	-
	Hired Tractor	2.86	8.82	26.15	30.36	-
	Manual Means	-	-	-	-	-



AVERAGE NUMBERS OF TRAINED OXEN FOR FARMERS IN AFGHANISTAN

PROVINCE OF GZM

YEAR		<u>NUMBER OF TRAINED OXEN PER FAMILY</u>					
		0	1	2	3	4	5
1978	Number of Families	100	91	167	7	6	0
	% of Families	26.95	24.53	45.01	1.89	1.62	0.00
1980	Number of Families	115	104	140	7	5	0
	% of Families	31.00	28.03	37.74	1.89	1.35	0.00
1985	Number of Families	254	57	58	2	0	0
	% of Families	68.46	15.36	15.63	0.54	0.00	0.00
1986	Number of Families	277	45	48	1	0	0
	% of Families	74.66	12.13	12.94	0.27	0.00	0.00
1987	Number of Families	283	43	44	1	0	0
	% of Families	76.28	11.59	11.86	0.27	0.00	0.00
<u>Average Number of Oxen per Family:</u>		1978	1.27				
		1980	1.15				
		1985	0.48				
		1986	0.39				
		1987	0.36				

Number of Farmers Questioned 371

TABLE 7B - AVERAGE NUMBER OF TRAINED OXEN FOR FARMERS IN THE CAMPS

PROVINCE OF GZM

YEAR		<u>NUMBER OF TRAINED OXEN PER FAMILY</u>					
		0	1	2	3	4	5
1978	Number of Families	27	26	100	2	4	0
	% of Families	16.98	16.35	62.99	1.26	2.52	0.00
1980	Number of Families	43	28	84	1	3	0
	% of Families	27.04	17.61	52.83	0.63	1.89	0.00
1985	Number of Families	75	32	51	0	1	0
	% of Families	47.17	20.13	32.08	0.00	0.63	0.00
1986	Number of Families	94	21	43	0	1	0
	% of Families	59.12	13.21	27.04	0.00	0.63	0.00
1987	Number of Families	139	1	0	0	0	0
	% of Families	99.38	0.63	0.00	0.00	0.00	0.00
<u>Average Number of Oxen per Family:</u>		1978	1.56				
		1980	1.33				
		1985	0.87				
		1986	0.70				
		1987	0.01				

Number of Farmers Questioned 160

AVERAGE LABOUR (FAMILY and HIRED) FOR FARMERS IN AFGANISTAN

PROVINCE OF GZM	1978	1980	1985	1986	1987
Average Family Labour per Farm	1.88	1.79	1.25	1.18	1.14
Average No. of Hired Labour per Farm (for farms using hired labour)	1.08	1.10	0.93	0.86	0.83
Number of Farms using Hired Labour	148	126	123	113	114
Number of Farmers Questioned	371				

TABLE 8(B) - AVERAGE LABOUR (FAMILY and HIRED) FOR FARMERS IN CAMPS

PROVINCE OF GZM	1978	1980	1985	1986	1987
Average Family Labour per Farm	1.81	1.63	1.35	1.14	0.02
Average No. of Hired Labour per Farm (for farms using hired labour)	1.37	1.35	1.25	1.24	0.30
Number of Farms using Hired Labour	85	84	83	75	1
Number of Farmers Questioned	160				

PROVINCE: GZB AVERAGE AREA AND YIELD OF CROPS GROWN

(Average for both Farmers in Camps and Afghanistan)

CROP	Total for Average	No. of Farmers who grew Crop (1)	% of Farmers who grew Crop	AVERAGE AREA					AVERAGE YIELD				
				1978	1980	1985	1986	1987	1978	1780	1985	1986	1987
IRR WHEAT	531	522	98.3	16.4	14.4	12.4	11.0	10.6	65.4	59.2	50.8	46.1	41.4
BARLEY	531	225	42.4	4.1	3.4	2.7	2.4	1.9	47.7	42.4	35.0	34.0	30.3
HAIZE	531	157	29.6	8.4	8.1	7.6	7.9	10.6	53.6	48.0	42.9	37.1	32.5
GRAPE	531	157	29.6	4.4	4.4	4.4	4.4	4.3	105.1	92.0	74.3	63.0	49.9
ALFALFA	531	152	28.6	2.8	2.8	2.8	2.9	2.6	81.1	74.9	68.5	49.0	27.5
PEA	531	107	20.2	7.5	6.8	6.1	5.3	4.6	42.2	38.0	33.0	29.0	22.7
DRY WHEAT	531	51	9.6	15.5	12.5	10.8	9.8	7.3	31.1	26.7	22.3	19.0	17.0
CLOVER	531	23	4.3	1.7	1.6	1.5	1.4	1.4	87.5	77.0	76.5	57.0	38.0
BEAN	531	17	3.2	3.0	2.8	2.1	2.1	2.0	33.0	29.6	23.1	20.3	32.0
ALMOND	531	17	3.2	4.2	4.2	4.2	4.2	2.6	91.1	86.6	74.0	67.2	193.5
POTATO	531	16	3.0	2.7	2.4	2.0	1.4	1.5	343.0	297.6	238.7	209.3	138.0
TOBACCO	531	11	2.1	2.0	1.7	1.8	1.8	1.7	53.9	51.9	48.0	45.0	42.3
ONION	531	10	1.9	4.4	3.6	2.7	2.3	2.3	547.3	504.9	387.0	302.6	*****
MUSTARD	531	10	1.9	3.1	2.6	2.0	1.6	1.5	29.9	25.5	19.6	16.0	20.3
CARROT	531	4	0.8	1.8	1.5	1.8	1.8	1.5	405.0	405.0	340.0	302.5	365.0
MELON	531	3	0.6	1.7	2.0	1.7	2.5	*****	523.3	348.0	290.0	225.0	*****
FRUIT	531	3	0.6	2.7	2.7	2.7	2.7	3.5	291.7	218.7	176.0	143.0	42.0
APPLE	531	3	0.6	1.3	1.3	1.3	1.3	1.5	716.7	650.0	606.7	553.3	325.0
MUNG BEAN	531	2	0.4	12.5	14.5	11.5	2.0	*****	28.5	22.5	19.0	15.0	*****
RICE	531	1	0.2	7.0	8.0	5.0	4.0	*****	53.0	50.0	48.0	45.0	*****
PLUM	531	1	0.2	4.0	4.0	4.0	4.0	4.0	180.0	180.0	165.0	160.0	150.0
RILEY	531	1	0.2	2.0	1.0	1.0	1.0	*****	32.0	30.0	18.0	15.0	*****
PEESET	531	1	0.2	1.0	1.0	1.0	1.0	*****	*****	*****	*****	*****	*****
COTTON	531	1	0.2	30.0	40.0	25.0	*****	*****	95.0	41.0	40.0	*****	*****
APRICOT	531	1	0.2	1.0	1.0	1.0	1.0	1.0	85.0	90.0	80.0	75.0	70.0

(1) In 1978

1987 PERCENTAGE OF VILLAGES GIVING FOLLOWING PRIORITY TO PROBLEM

(Contd) - ANALYSIS OF GREATEST FARMING PROBLEMS - COMMUNITY SURVEY

PROVINCE OF GUJARAT

1980 PERCENTAGE OF VILLAGES GIVING FOLLOWING PRIORITY TO PROBLEM

[illegible]

1978

[illegible]